TATUNG®

SERVICE INFORMATION
MODEL CM-1480
COLOUR DISPLAY MONITOR

Code No. 79-1191-2

CM-1480 SERIES COLOUR DISPLAY MONITOR

SERVICE MANUAL

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CHAPTER 1

SPECIFICATIONS

APPLICATION:	Typical data display device for personal computer applications.
POWER INPUT:	90 watts (Nominal), AC rated voltage-refer to backcover label. A 2 metre 3-wire mains cord is supplied.
VIDEO SIGNALS:	16 colour: Red, green, blue and intensity video signals. 64 colour: R,G,B, and r,g,b, (intensity) video signals. All are positive TTL.
SYNC. SIGNALS:	Horizontal: 15.75kHz +/- 300Hz (mode 1) or 21.853kHz +/- 300Hz (mode 2) positive TTL, autoswitching by TTL. Vertical: 47-63Hz positive TTL at mode 1. 47-63Hz negative TTL at mode 2.
SIGNAL CONNECTOR:	9-Pin D-shell connector.
DISPLAY TUBE:	14", 90 deflection, 29.1mm neck, 0.31mm dot pitch. dot inline, dark tint non-glare. Type No.: M34JDU30X66
DISPLAY AREA:	Width: 250mm Height: 170mm
DISPLAY COLOUR:	Mode 1: 16 colours. Mode 2: 64 colours.
DISPLAY CHARACTER:	2000 characters (80CH. X25 Row on 8x8 dot matrix)
DISPLAY TIME:	Horizontal: mode 1: 44.5us mode 2: 39.37us Vertical: mode 1: 12.58ms mode 2: 16.01ms
RETRACE TIME:	Horizontal: mode 1: 6.0us mode 2: 6.0us Vertical: mode 1: 1.2ms mode 2: 0.6ms
RESOLUTION:	Horizontal: 640 dots Vertical: mode 1: 200 scan lines (non-interlaced) mode 2: 350 scan lines (non-interlaced)
MISCONVERGENCE:	0.5mm Max. within data area.
USER CONTROLS:	Power on-off, brightness, contrast, vertical size 1, vertical size 2, Multi colour switch, horizontal centre 1, horizontal centre 2. video reverse switch, power voltage 120VAC/240VAC selector.
SERVICE CONTROLS:	H-Hold 1, H-Hold 2, H-Width 2, H-Centre, V-Centre, V-Hold, Focus, Screen, E-W Pincusion, set EHT, R-Drive, r-Drive, G-Drive, g-Drive, R-BKG, G-BKG, B+12.75V.
ENVIRONMENTAL:	Operation: 10°C to 35°C ambient Storage: -40°C to 50°C Humidity: 50% to 80% (non-condensing) Altitude: to 7000 feet above sea level.
DIMENSIONS:	365 (W) X 315 (H) X 400 (D) mm
WEIGHT:	13.5kg (net)

ENVIRONMENTAL:	Operation: 10°C to 35°C ambient Storage: -40°C to 50°C Humidity: 50% to 80% (non-condensing) Alitude: to 7000 feet above sea level.
DIMENSIONS:	365 (W) X 315 (H) X 400 (D) mm
WEIGHT:	13.5kg (net)

CHAPTER 2

PRECAUTIONS AND NOTICES

2-1 SAFETY PRECAUTIONS

1. Observe all cautions and safety related notes located inside the display cabinet and on the display chassis.

2. Operation of these displays outside the cabinet or with the cover removed, involves a shock hazard from the display power supplies. Work on the display should not be attempted by anyone who is not thoroughly familiar with precautions necessary when working on high voltage equipment.

3. Do not install, remove or handle the picture tube in any manner unless shatter-proof goggles are worn. People not so equipped should be kept away while handling picture tube. Keep picture tube away from the body while handling.

4. The picture tube is constructed to limit X-RADIATION to 0.5 mR/HR at 300 microamperes anode current. For continued protection, use the recommended replacement tube only, and adjust the voltages so that the designated maximum rating at the anode will not be exceeded.

5. Before returning a serviced display to the customer, a thorough safety test must be performed to verify that the display is safe to operate without danger or shock. Always perform an AC leakage current check on the exposed metallic parts of the cabinet. Proceed as follows:

   Connect the monitor power lead to the mains supply, via an isolation transformer, and switch on. Using the test circuit shown in Fig. 2-1, measure the AC leakage current between each pole (L and N) of the supply and all accessible metal parts. The earth leakage current must not exceed 3.5mA.

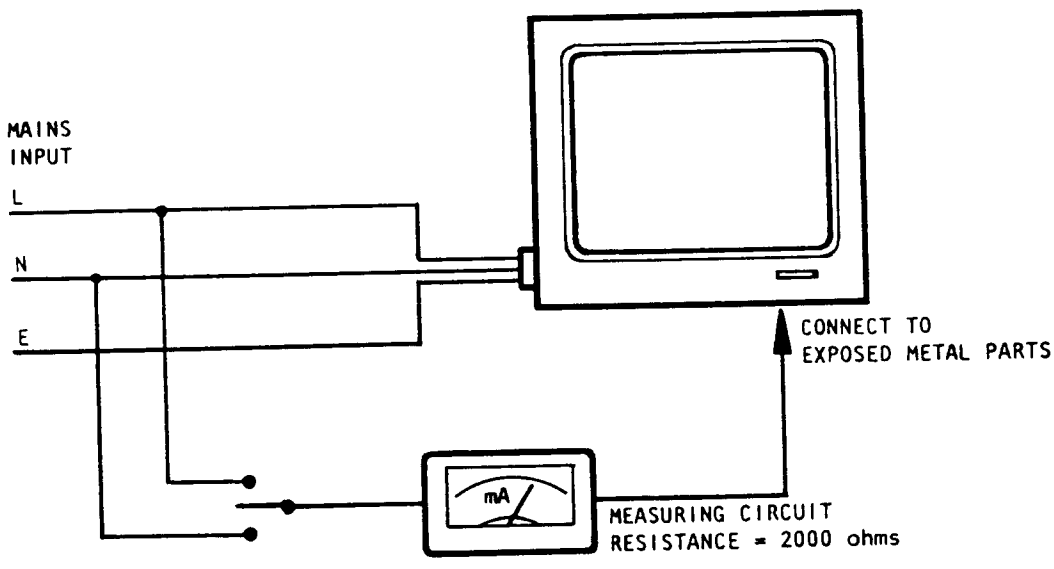


Fig 2-1 AC LEAKAGE CURRENT TEST CIRCUIT

2-2 PRODUCT SAFETY NOTICE

Many electrical and mechanical parts in this chassis provide special visual safety protection. The protection afforded by them cannot necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. .
Before replacing any of these components, read the parts list in this manual carefully. The use of substitute replacement parts which do not have the same safety characteristics as specified in the parts list may create shock, fire, X-RAY radiation or other hazards.

2-3 SERVICE NOTES

1. When replacing parts or circuit boards, wrap the wires around terminals before soldering.

2. When replacing a high wattage resistor (more than 1/2W) on a circuit board, keep the resistor about 10mm (1/2 in.) away from circuit board.

3. Keep wires away from high voltage or high temperature components.

4. Keep wires in their original position so as to reduce interference.

WARNING

CHECK POWER VOLTAGE SELECTOR IS CORRECT !

120 VAC OR 240 VAC

CHAPTER 3

OPERATING INSTRUCTIONS

3-1 CONTROLS AND CONNECTIONS

* POWER: The power rocker switch turns the monitor on or off.

* MULTI COLOUR INDICATOR: A green LED lights when the monitor is switched on with colour displayed on the normal state. Push Multi-colour switch on the front to appropriate position for desired display.

* BRIGHTNESS: The brightness control sets the overall or average intensity of illumination of the display

* CONTRAST: The contrast control sets the intensity of the data displayed.

* 120/240VAC SELECTOR: The selector switch adapts the monitor for operation from the local AC power source.

* V. SIZE (1 and 2): The vertical size adjustments (mode 1 and mode 2) set the amount of vertical (top to bottom) raster deflection.

* H. PHASE (1 and 2): The horizontal phase adjustments (mode 1 and mode 2) set the horizontal (left to right) position of the display within the raster area.

* POWER INPUT JACK: A 3-pin power connector is located on the rear panel.

* POWER LEAD: A 2m 3-wire mains lead connects power to the monitor.

* VIDEO SIGNAL CABLE: A 1.5m cable, terminated with a 9 Pin D-type connector, supplies video and sync. signals to the monitor. The cable is attached to the monitor and is not detachable. Fig 3-1 illustrastes the D-type connector. Table 3-1 lists the connector signal for each mode of operation.

* VIDEO REVERSE SWITCH: Move the switch to reverse the background and image colours.

3-2 Set up and Operation:
Perform the following steps to set up and operate the monitor.

1. Place the monitor on a flat surface near the computer and near an AC power outlet. Be certain that the ventilation slots in the cabinet are not blocked or obstructed.

2. Connect the video signal cable from the monitor to the computer.

3. Plug the power cord into the monitor and then into an AC outlet. Be certain that the 120/240 VAC selector switch on the rear panel is set to the correct position.

WARNING: Removing the earth from the AC power source may present a potentially lethal shock hazard.

4. Turn on the computer and the monitor. The front panel green LED should light. The system prompt for the computer should be displayed.

5. Adjust the left panel brightness and contrast controls to obtain a comfortable display.

If your CM-1480 monitor requires service, refer to the controls and adjustments information of this publication and verify that all controls and adjustments on the display are correctly set. If your monitor does require service, it must be returned with the mains lead.

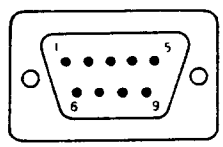


Fig 3-1 9-Pin Colour Monitor
Signal Cable

Table 3-1

Pin No.	Description	
	Mode 1	Mode 2
1	Shield Gnd.	Ground
2	Signal Gnd.	r
3	Red	R
4	Green	G
5	Blue	B
6	Intensity	g
7	Unused	b
8	Horiz. sync.	Horiz. sync.
9	Vert. sync.	Vert. sync.

CHAPTER 4

ADJUSTMENTS

4-1

This chapter contains instructions for performing the various monitor adjustments. Because these adjustments are performed while the monitor is switched on, observe proper precautions to avoid personal injury. Specific warnings are included where necessary.

Paragraph 4-2 lists the various adjustment devices and their component numbers. They are arranged according to the circuit board or location where they can be found. If a particular adjustment does not correct a problem, refer or section 5 for additional information.

4-2 Monitor Adjustment Devices

	DEVICE	DESCRIPTION
	EXTERNAL	
	R208	Left panel brightness control
	R209	Left panel contrast control
	VIDEO BOARD (PWB-1324)	
	R526	Primary red drive
	R527	Secondary red drive
	R566	Primary green drive
	R567	Secondary green drive
	CRT BOARD (PWB-1337)	
	R523	Red cut-off
	R563	Green cut-off
	R593	Blue cut-off
	MAIN BOARD (PWB-1337)	
	R309	Vertical hold
	R306	Vertical size, mode 1 (Rear panel)
	R366	Vertical size, mode 2 (Rear panel)
	R326	Vertical centring
	R408	Horizontal hold, mode 1
	R468	Horizontal hold, mode 2
	R433	Horizontal width, mode 1
	R493	Horizontal width, mode 2
	R413	Horizontal phase, mode 1 (Rear panel)
	R473	Horizontal phase, mode 2 (Rear panel)
	R435	Horizontal centring
	R333	E-W pincusion
	R907	Sub-brightness
	R451	22.5kV EHT
	POWER SUPPLY	
*	R813	B+ 12.8 +/-0.1V
	OTHER	
	Focus VR	High voltage resistor block
	G2 VR	High voltage resistor block

4-3 PREPARATION

Perform the following steps to prepare the monitor for adjustment:
(1) Remove the cabinet back to access internal adjustments.

(2) Turn the monitor on and allow it to warm up for approximately 30 minutes.

(3) Read each adjustment procedure before performing it.

1. B+ ADJUSTMENT

The switch-mode power supply has a B+ output voltage adjustment located within the unit. Variable resistor R813 sets the 12.80 VDC output.

WARNING: The switch-mode power supply contains circuits that generate dangerous high-frequency, high amplitude signals that present a potentially lethal shock hazard. Exercise extreme caution when adjusting or working near this unit.

Using a DVM, measure the 12.80V B+ voltage and adjust R813 to obtain a reading of 12.80V, +/-0.1V. R813 may be accessed through a hole labeled B-ADJ in the side of the power supply enclosure.

2. VERTICAL HOLD

The vertical hold adjustment prevents the display from rolling upwards or downwards. Adjust R309 to stabilize the display by turning it first to one extreme and then backing off until the display just stabilizes. Repeat this procedure from the opposite extreme until the display just stabilizes. Set R309 between the two settings that stabilize the display.

3. VERTICAL SIZE

The vertical size adjustment sets the amount of vertical (top to bottom) raster deflection. The vertical size adjustments for both mode 1 and mode 2 are located externally on the rear panel. To adjust vertical size;

(1) Turn the G2 control clockwise until the raster just appears.

(2) Adjust R306 (V. SIZE 1) or R366 (V.SIZE 2) for a raster height of 170mm +/-2mm in each mode 1 or mode 2 respechively.

(3) Turn the G2 control counterclockwise until the raster just disappears.

4. VERTICAL CENTRING

The vertical centring adjustment shifts the whole display up or down within the raster. To adjust centring:

(1) Verify that the vertical size is correct. Adjust if necessary.

(2) Turn the G2 control clockwise until the raster just appears.

(3) Adjust R326, the vertical centring pot, so that the display is centred from top to bottom within the raster.

(4) Turn the G2 control counterclockwise until the raster just disappears.

5. HORIZONTAL HOLD

The horizontal hold adjustment prevents the display from shifting horizontally and breaking up in diagonal segments. To adjust the horizontal hold:

(1) Connect a jump lead from test point TP22 to earth.

(2) Adjust R408 (mode 1) or R468 (mode 2) to eliminate horizontal tearing and restore horizontal hold.

(3) Remove the jump lead from TP22.

6. HORIZONTAL WIDTH

The horizontal width adjustment sets the amount of horizontal (left to right) raster deflection. To adjust horizontal width:

(1) Turn the G2 control clockwise until a raster just appears.

(2) Adjust R433 (mode 1) or R493 (mode 2) so that the display width is 250mm +/- 2mm in each mode.

(3) Turn the G2 control counterclockwise until the raster just disappears.

7. HORIZONTAL PHASE

The horizontal phase adjustment sets the left-to-right position of the display within the raster area. To adjust horizontal phase:

(1) Turn the G2 control clockwise until the raster just appears.

(2) Adjust R413 (mode 1) or R473 (mode 2) to centre the display from left to right within the raster.

(3) Turn the G2 control counterclockwise until the raster just disappears.

8. HORIZONTAL CENTRING

The horizontal centring adjustment shifts the whole raster from left to right for mode 2. This adjustment is only present for mode 2. To adjust horizontal centring:

(1) Turn the G2 control clockwise until the raster just appears.

(2) Adjust R435 to centre the raster from left to right for mode 2.

(3) Turn the G2 control counterclockwise until the raster just disappears.

9. RGB DRIVE

The red and green drive adjustments set the amplitudes of the red and green CRT drive voltages relative to the blue drive voltage. (There is no blue drive adjustment.) When set properly, all three

(RGB) drive voltages will be the same. To adjust the red and green drive voltages:

(1) Display a white field.

(2) Set the left panel contrast and brightness controls to maximum.

(3) Using an oscilloscope, measure and record the amplitude of the blue drive voltage at TP52B on the CRT drive board. This value should be approximately 60 Vp-p.

(4) Next, measure the amplitude of the red drive voltage at TP52R. If necessary, adjust the two red (R and r) drive pots (R526 and R527) so that the amplitude of the red drive voltage matches that of the blue drive voltage recorded in step 3.

(5) Measure the amplitude of the green drive voltage at TP52G. If necessary, adjust the two green (G and g) drive pots (R566 and R567) so that the amplitude of the green drive voltage matches that of the blue drive voltage recorded in step 3.

10. HORIZONTAL LINE PRECISION

The horizontal line precision adjustment sets the relative contributions of the R, G, and B bias controls to produce a white horizontal line. This adjustment should be performed under low light. To adjust the horizontal line precision:

(1) Remove the input signal from the monitor. (Disconnect video cable from the computer.)

(2) Set the left panel contrast control to maximum and the left panel brightness control to minimum.

(3) Set the R,G, and B cutoff controls (R523, R563, and R593) to mid-position.

(4) Set sub-brightness control R907 to its mid-position.

(5) Adjust G2 for 500 VDC. G2 voltage may be measured from the foil side of the CRT drive board.

(6) Connect a jump lead between points M and N on the main board.

(7) Turn the R cutoff control (R523) counterclockwise until a red horizontal line just appears.

(8) Turn the G and B controls (R563 and R593) counterclockwise until a white line is displayed.

(9) Remove jump lead connecting points M and N.

(10) Perform the brightness level adjustment procedure in the following section.

11. BRIGHTNESS LEVEL

The sub-brightness control (R907) sets the threshold for the front panel brightness control. This control should be adjusted with the monitor in mode 2. Adjustment should be performed under low light.

To adjust the brightness level:

(1) Display a white field on the entire screen.
(2) Set the front panel brightness control to minimum.

(3) Adjust R907 so that the display just disappears.

12. E-W PINCUSHION

The E-W pincushion adjustment reduces the horizontal pincushion distortion of the raster. (Pincushion distortion is characterized by sides of the display which bow inward, especially toward the centre of the display.)
This control should be adjusted with the monitor in mode 2. To adjust the E-W pincushion:

(1) Display a crosshatch pattern.

(2) Adjust R333 so that any horizontal pincushion distortion is corrected.

13. FOCUS

The focus adjustment (the upper control on high-voltage resistor block) varies the focus voltage to produce the sharpest display detail. To adjust the focus:

(1) Display a dot test pattern.

(2) Set the front panel contrast and brightness controls for a comfortable display.

(3) Adjust the focus control for best overall focus. Check the centre, top centre, bottom centre, left centre, and right centre areas of the display for good focus.

(4) Verify acceptable overall focus using the fill screen test with such characters as @ and #.

14. STATIC CONVERGENCE

Static convergence adjustment refers to setting each electron beam so that all three beams (red, green and blue) hit the same spot. When all three beams hit the same spot on the CRT mask with equal intensity, a white dot appears on the screen. This adjustment should be performed under low light.

NOTE: Read the entire procedure thoroughly before performing this adjustment.
To adjust static convergence:

(1) Locate the convergence magnets on the neck of the CRT. Identify the 4-pole, 6-pole and purity magnets.
(2) Mark the present position of the magnets by drawing a pencil line along the sides of all the magnets. This will give you a reference point in case the adjustment becomes difficult.
(3) Carefully remove the clear adhesive glue which holds the magnets in place. The glue may be scraped away, but be careful not to damage the CRT neck.

(4) Rotate the 4-pole and 6-pole magnets slightly to loosen them. Do not force them; slowly work them back and forth until they can be moved with only moderate effort. Do not rotate the purity magnet.

(5) Turn the monitor on and allow it to warm up for approximately 30 minutes.

(6) Display a crosshatch pattern.

(7) Separate the three colours (red, green, and blue) horizontally and vertically. This is accomplished by rotating the 4-pole and 6-pole magnets until the three colours are visible. The resulting display shows three distinct horizontal lines (red, green, and blue) instead of one white horizontal line throughout the display. Similarly, the white vertical lines are now split into three distinct vertical lines (red, green, and blue).

(8) Superimpose the red and blue horizontal lines at the centre of the screen. This is accomplished by rotating both tabs of the 4-pole magnets simultaneously until the red and blue lines overlap to form one magenta line. Use a 10X or better magnifier to more precisely adjust the overlap once the line appears magenta to the unaided eye.

(9) Superimpose the red and blue vertical lines at the centre of the screen. This is accomplished by changing the angle between the 4-pole magnets until the red and blue lines overlap to form one magenta line. Use a 10x or better magnifier to more precisely adjust the overlap once the line appears magenta to the unaided eye.

(10) Verify that the red and blue horizontal and vertical lines are now superimposed and appear magenta. Because these adjustments are magnetic in nature, they are somewhat interactive. Repeat the previous two steps if necessary.

(11) Superimpose the magenta and green horizontal lines at the center of the screen. This is accomplished by rotating both tabs of the 6-pole magnets simultaneously until the magenta and green lines overlap to form one white line. Use a 10x or better magnifier to more precisely adjust the overlap once the line appears white to the unaided eye.

(12) Superimpose the magenta and green vertical lines at the centre of the screen. This is accomplished by changing the angle between the 6-pole magnets until the magenta and green lines overlap to form one white line. Use a 10x or better magnifier to more precisely adjust the overlap once the line appears white to the unaided eye.

(13) Verify that the magenta and green horizontal and vertical lines are now superimposed and appear white. Because these adjustments are magnetic in nature, they are somewhat interactive. Repeat the previous two steps if necessary.

(14) Verify overall convergence by once again examining the cross-hatch pattern. Check the horizontal and vertical lines at the centre of the screen for proper convergence. Repeat any steps as necessary.

15. ADJUSTMENT AND TEST LOCATION

(1) PCB-MAIN adjustment and test location. (See Fig 4-1)

(2) PCB-VIDEO DRIVE adjustment and test location. (See Fig 4-2)

(3) PCB-CRT DRIVE adjustment and test location. (See Fig 4-3)

(4) PCB-POWER adjustment and test location. (See Fig 4-4)

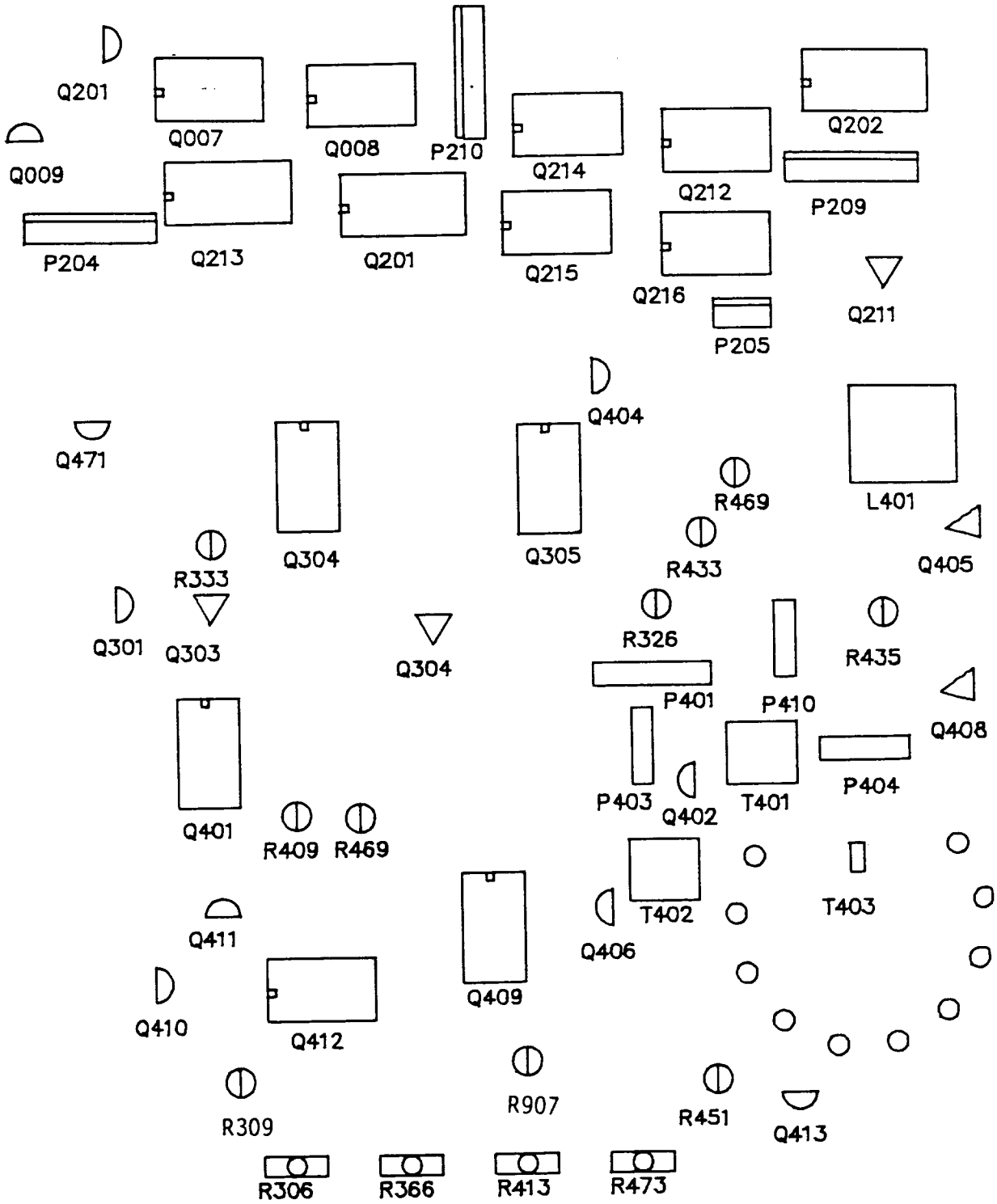


Fig 4-1 PCB-MAIN adjustment and test location

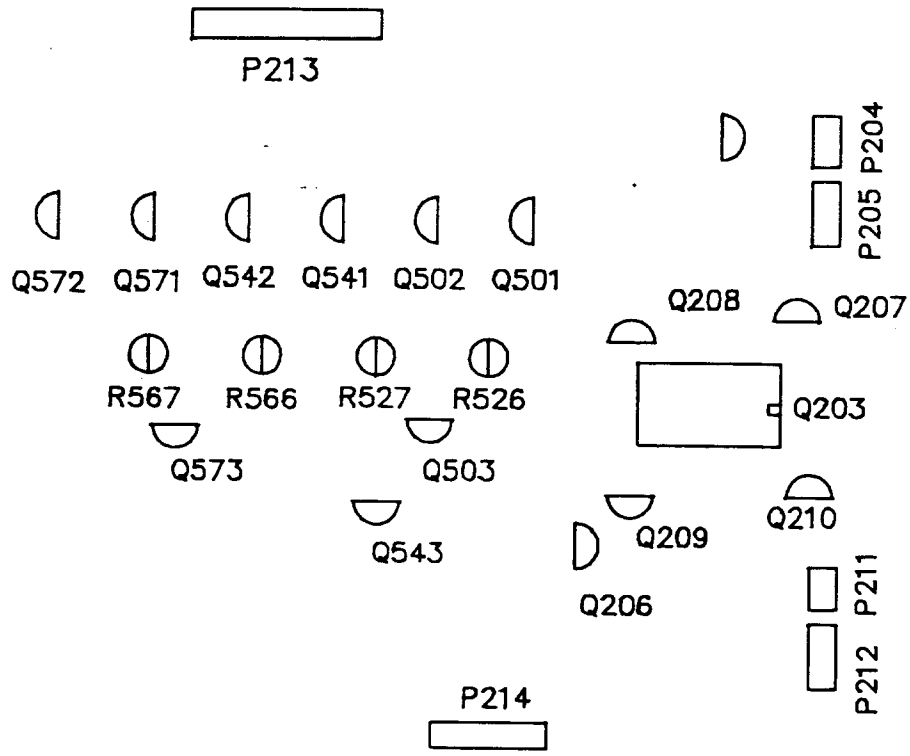


Fig 4-2 PCB-VIDEO DRIVE adjustment and test location

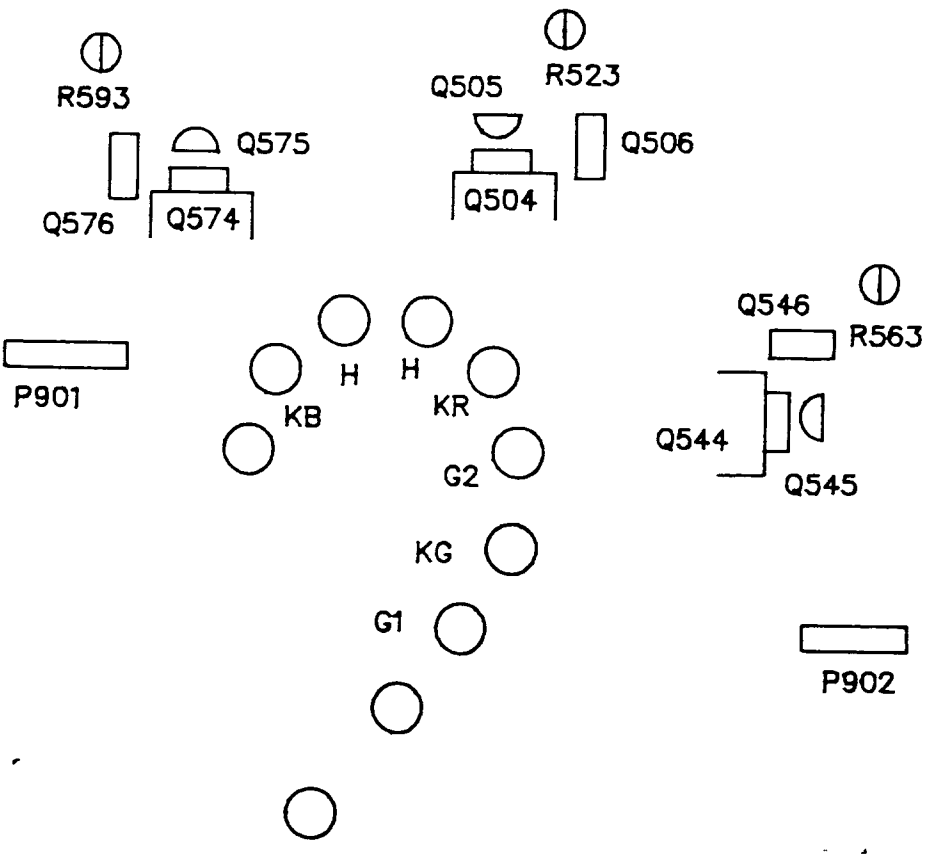


Fig 4-3 PCB-CRT DRIVE adjustment and test location

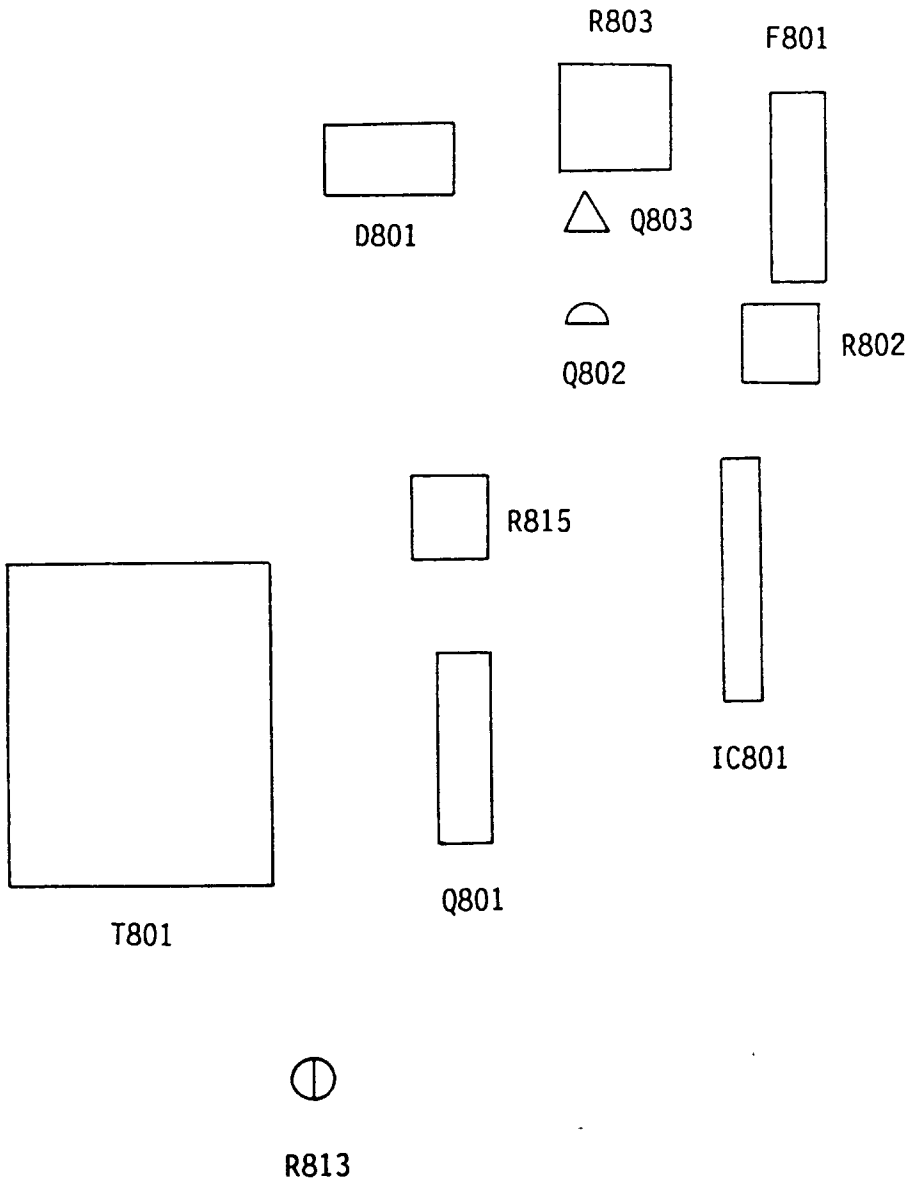


Fig 4-4 PCB-POWER adjustment and test location

CHAPTER 5

TROUBLESHOOTING

This chapter provides information on troubleshooting the CM-1480 colour display monitor. Enough information is included to assist in diagnosing most faults to the major component level.

5-1 ORGANIZATION

General troubleshooting information is included in the each paragraph of this section. Read these paragraphs before proceeding. They contain safety guidelines, tests and diagnostics, and other important information.

Following this general information is a series of troubleshooting flowcharts. These charts are designed to assist in diagnosing faults to the major component level. Always begin with the General Troubleshooting Chart. This chart will direct you to an adjustment or to a more detailed chart.

5-2 SAFETY GUIDELINES

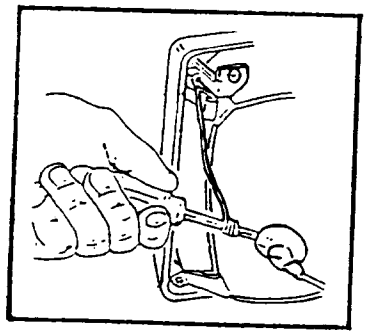
Read the following safety notes carefully before attempting to troubleshoot or repair this monitor.

WARNING: The anode of the CRT retains a potentially lethal voltage when the monitor is turned off. Perform repairs only after the CRT has been properly discharged. Refer to Fig 5-1 and the following procedure to discharge the CRT anode:

(1) Connect a clip lead or heavy gauge wire to chassis ground.

(2) Connect the other end of the lead to the stem of a flat blade screwdriver that has an insulated handle.

(3) Insert the blade of the screwdriver under the rubber insulation that covers the anode lead on the CRT and make contact with the anode terminal. Depending on the quantity of charge present on the anode, a distinct snap may be heard as the CRT discharges. Allow approx 3 seconds for the CRT to discharge completely.



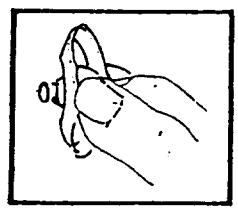


Fig 5-1 CAREFULLY SLIDE A GROUNDED FLAT SCREWDRIVER TIP UNDER THE LIP OF THE ANODE LEAD. AFTER DISCHARGING THE VOLTAGE DISCONNECT THE ANODE LEAD FROM THE CRT.

WARNING: Operation of the CRT at voltages higher than 25kV may produce X-rays. Always verify that the anode voltage is at normal level when servicing the monitor. Do not operate the monitor with excessively high voltage any longer than is necessary to locate the cause of the excessive voltage.

WARNING: The switch mode power supply contains circuits that generate dangerous high-frequency, high amplitude signals that present a potentially lethal shock hazard. Do not attempt to troubleshoot the power supply. If the power supply requires service, return it to the manufacturer.

WARNING: Parts of the power supply circuitry are not isolated. To prevent both personal injury and equipment damage, an isolation transformer must be used while troubleshooting this monitor.

CAUTION: All components should be replaced only with types identical to those in the original circuit, and their physical location, wiring and lead dress must conform to the original layout upon completion of repairs.

5-3 AC LEAKAGE TEST

The repair and reassembly of the monitor can inadvertently cause a loss of electrical isolation between the AC power wires and the exposed metal parts of the monitor. If this isolation is lost or significantly reduced, electrical shock can result.

Carry out the AC leakage current tests delailed in chapter 2, paragraph 2-1 to verify the safety of the equipment.

5-4 SUGGESTED TOOLS AND EQUIPMENT

The following tools and supplies are recommended for servicing the monitor.

* Flat-blade screwdriver, 6mm blade
* Philips screwdrivers, No. 1 and No. 2 tips
* Plastic alignments tools.
* Diagonal cutters
* Wire strippers
* Long nose pliers
* Soldering iron, 25 to 40 watt
* Solder, 60/40 (HE-490-185)
* Desoldering braid (HE-354-59)

The following equipment is recommended for troubleshooting the monitor as described in this chapter:

* PC-AT computer or equivalent
* CGA and EGA video cards
* Oscilloscope: DC to 100MHz, dual trace triggered sweep.
* Oscilloscope probe: low capacitance, 4 ns rise time.
* Digital voltmeter: high impedance input, zero to 1000 volts, zero to 1 megohm.
* High-voltage probe: zero to 40kV.
* 10x magnifying glass (or better)
* Isolation transformer

5-5 INSPECTION AND PREPARATION

Before turning the monitor on, inspect the power lead, video cable, and all connectors for damaged insulation or loose pins.
Inspect the exterior of the monitor for signs of damage. If physical damage is evident, remove the cabinet back and inspect further before proceeding.
If these preliminary checks do not indicate a problem, proceed as follows:

(1) Connect the video cable from the monitor to the computer.
(2) Insert Tatung test floppy disc.
(3) Turn computer and monitor on. Observe display for faults and refer to the troubleshooting section only after reading the remaining procedures in this section.
(4) Allow the monitor to warm up for approximately 30 minutes, unless a fault diagnosed in (3) prevents this.

5-6 COLOUR BAR TEST

1. Press F1 or F2.
2. Press shift 6
3. Colour bars should now be displayed.

Use this test in conjunction with the troubleshooting charts which follow this section.

5-7 WHITE FIELD

(1) Press F1 or F2
(2) Press F4 or F5, F6, F7, F8.

5-8 TROUBLESHOOTING CHARTS

This section contains a series of troublshooting charts designed to assist in diagnosing faults to the major component level. Always begin with the General Troubleshooting Chart. This chart will then direct you to check a particular item, perform an adjustment or consult a more detailed chart. The charts are:
General Troubleshooting Chart (Fig 5-2)
Power Supply Troubleshooting Chart (Fig 5-3)
Video Board Troubleshooting Chart (Fig 5-4)
CRT Board Troubleshooting Chart (Fig 5-5)
Main Board Troubleshooting Chart (Fig 5-6)

NOTE: Always refer to the appropriate schematic as you work through the steps of a troubleshooting chart. These charts are designed to assist in diagnosing faults, but they connot substitute for the information contained in the schematics.

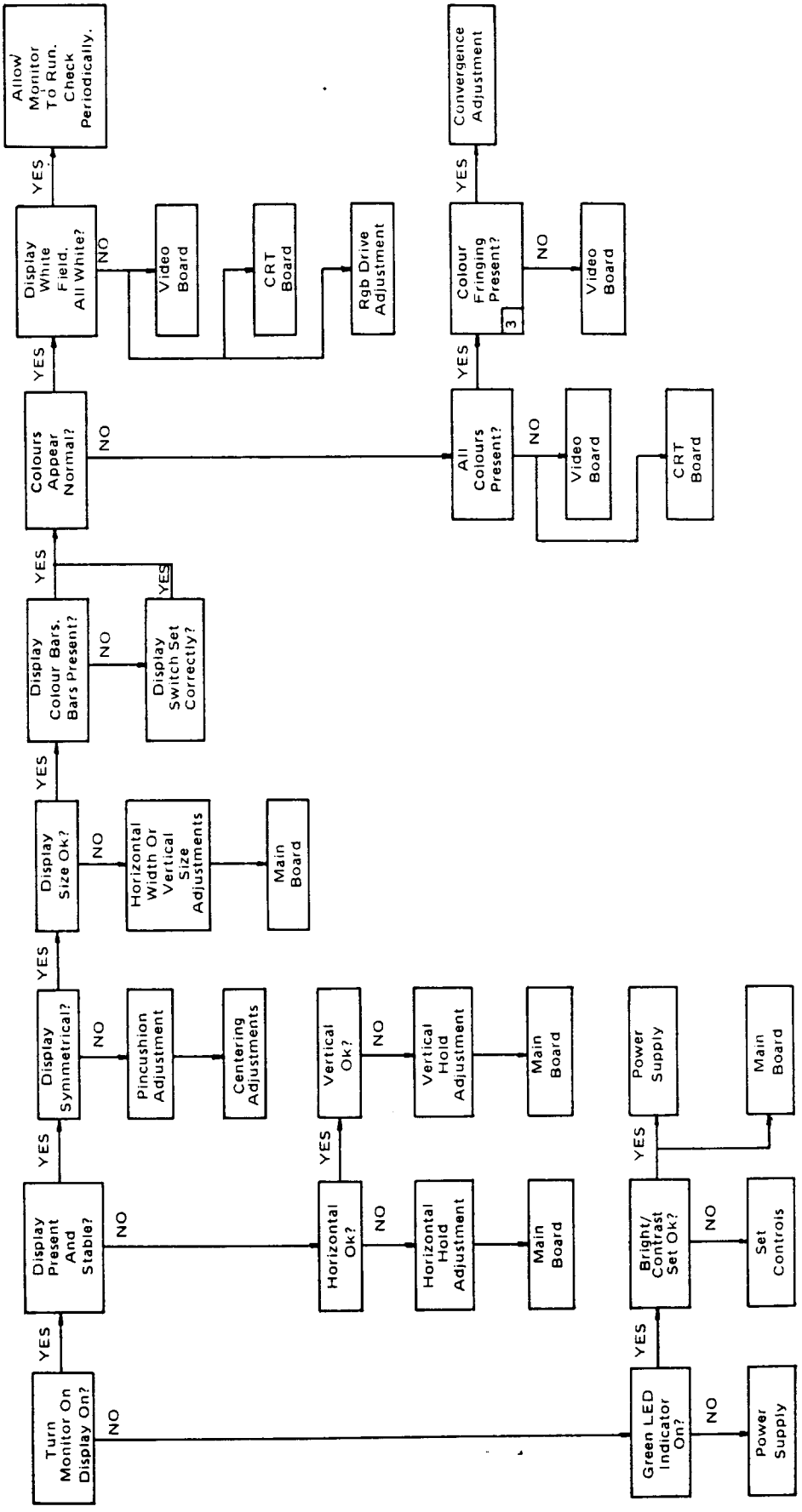


Fig 5-2 General Troubleshooting Chart

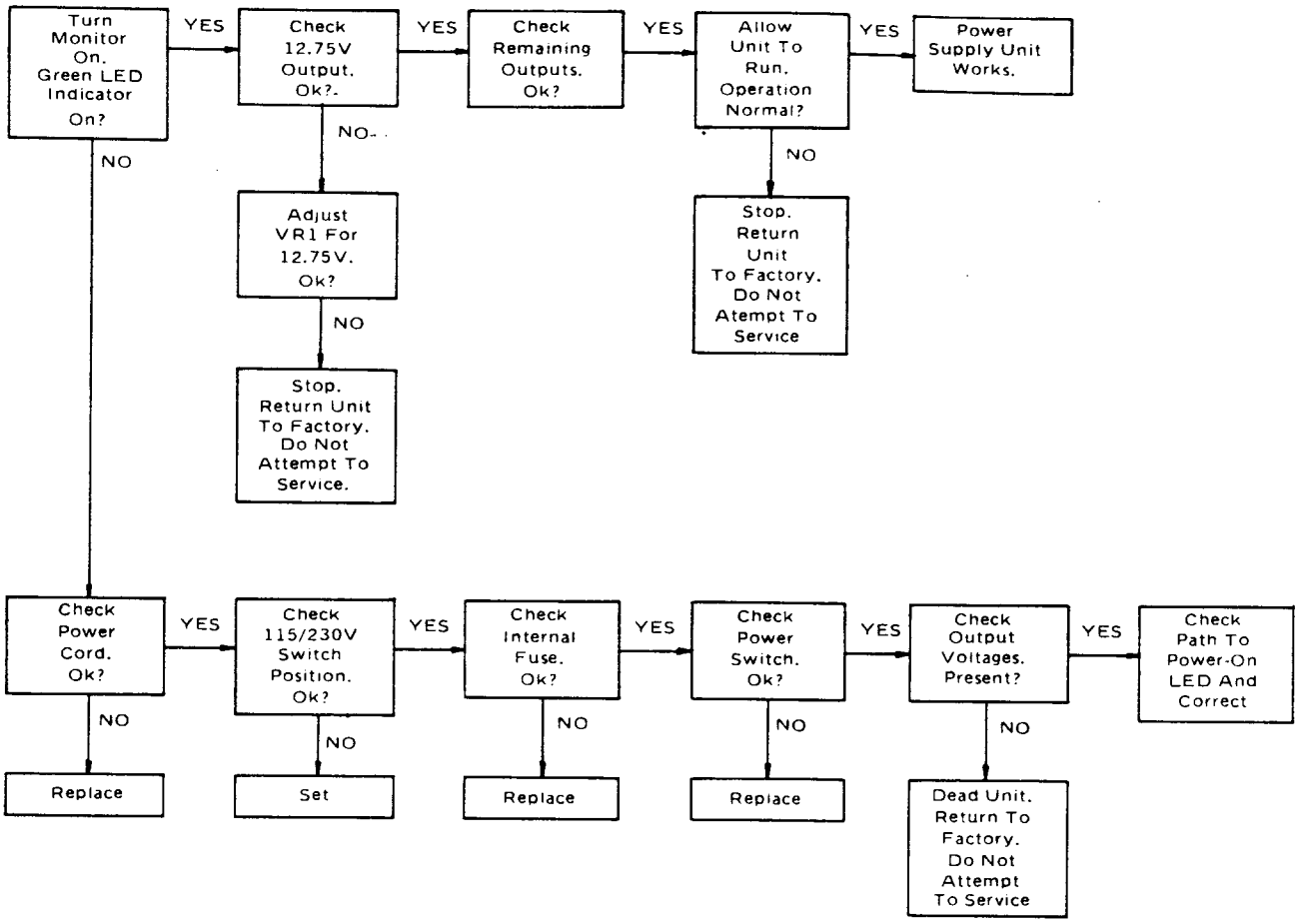


Fig 5-3 Power Supply Troubleshooting Chart

Notes

1. R813 may be accessed through a hole labeled B-ADJ in the side of the power supply enclosure.
2. The video board must be removed to access the internal fuse. The fuse is located below and to the left of R813.

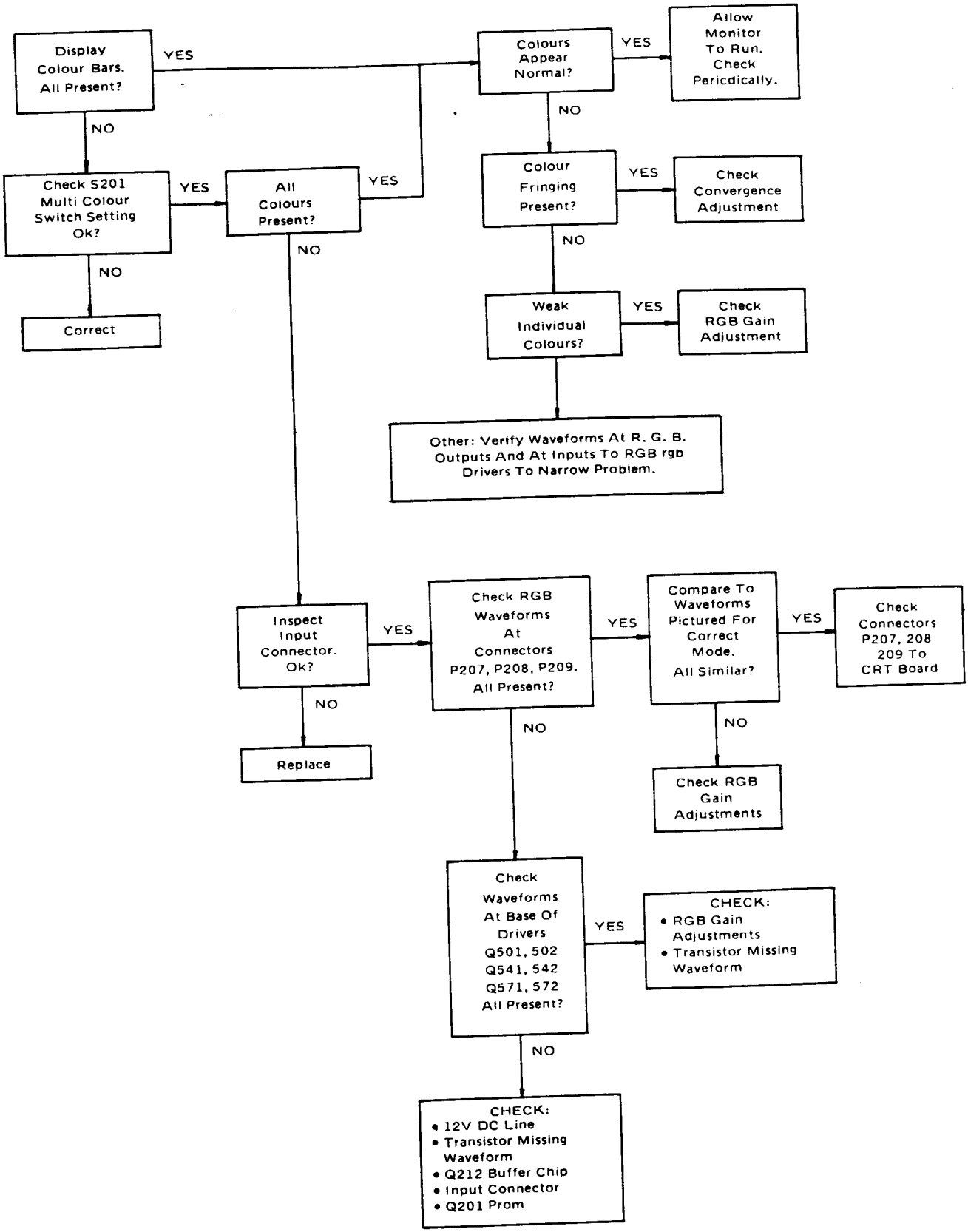


Fig 5-4 Video Board Troubleshooting Chart

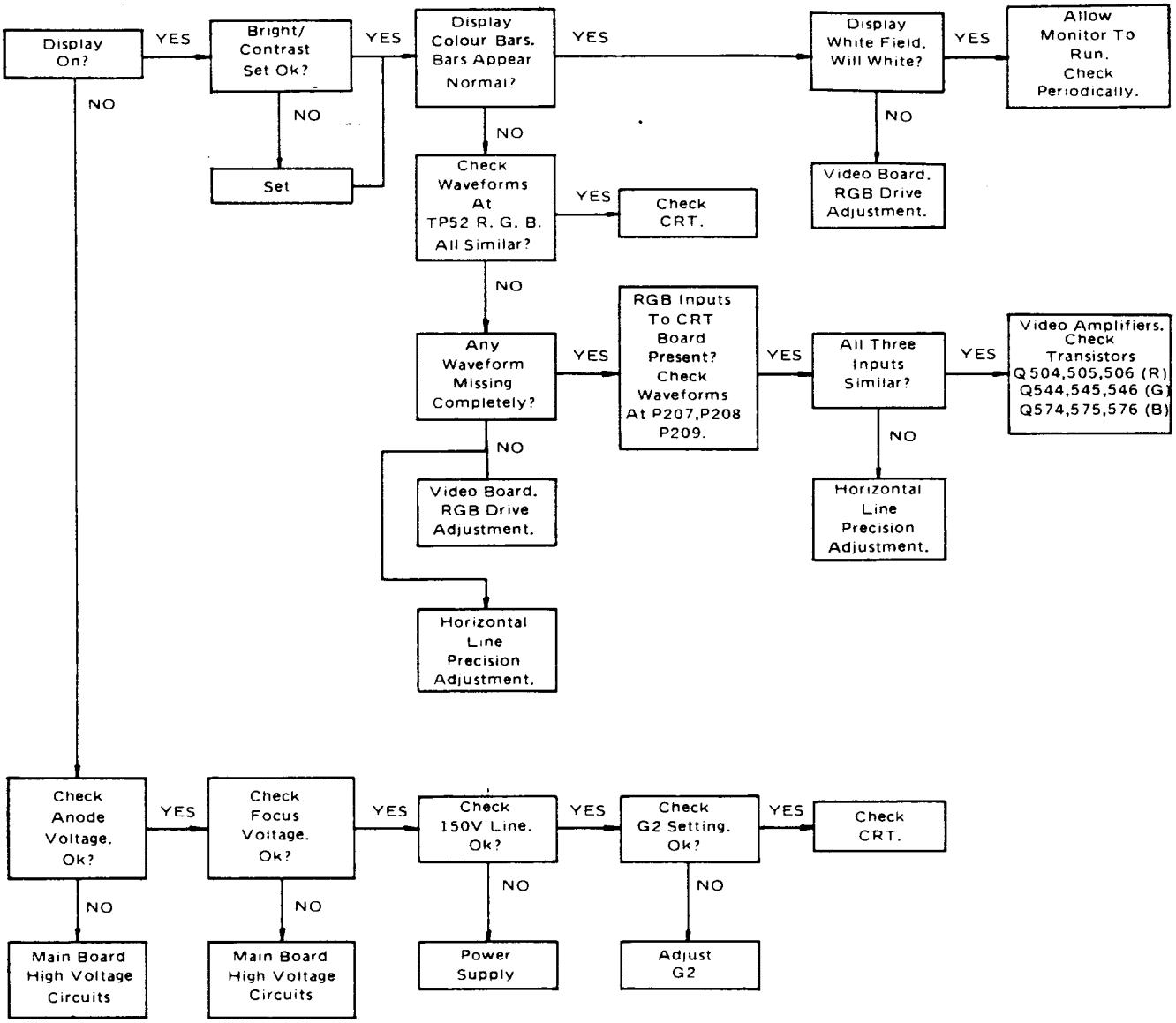


Fig 5-5 CRT Board Troubleshooting Chart

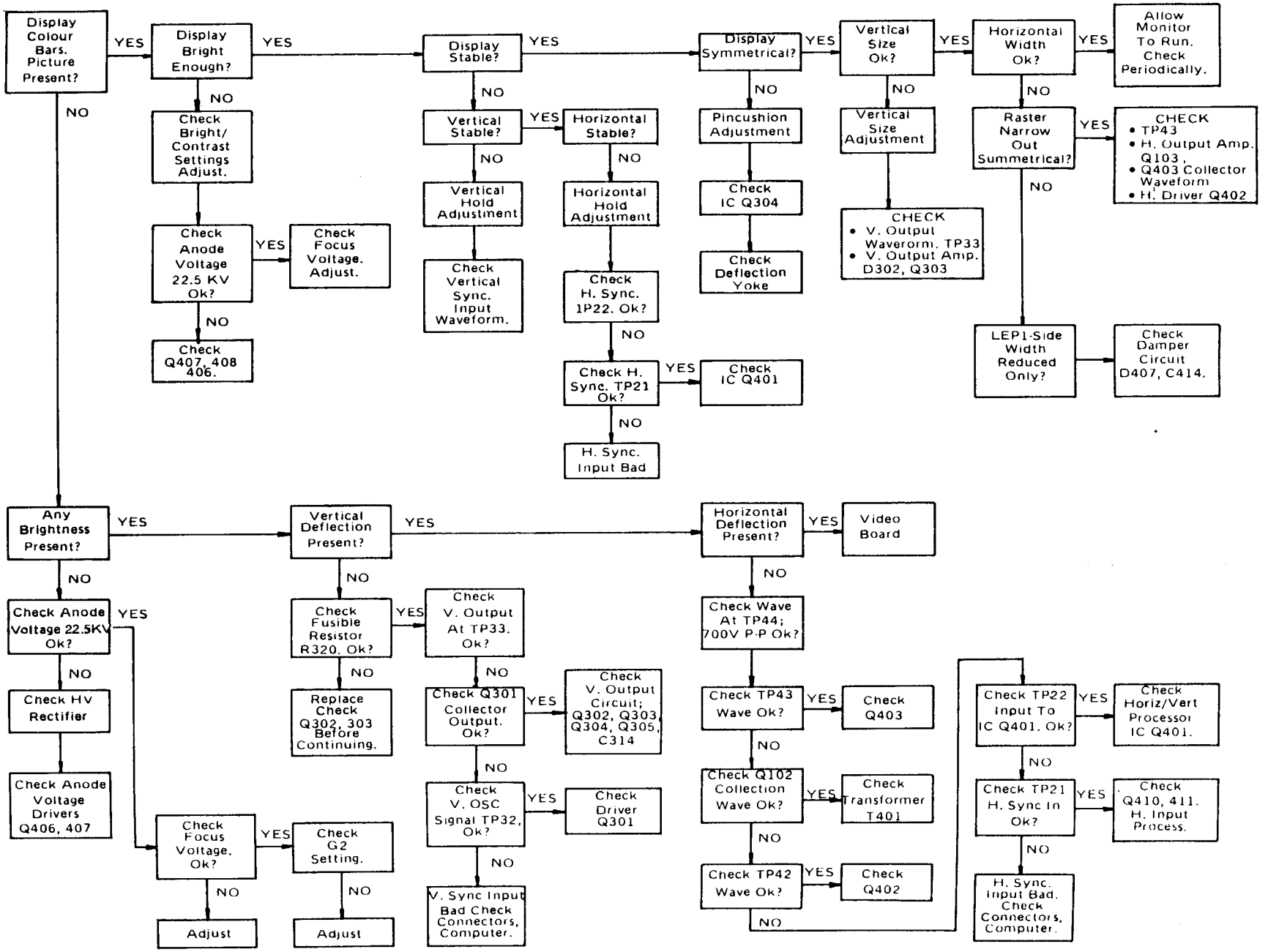


Fig 5-6 Main Board Troubleshooting Chart

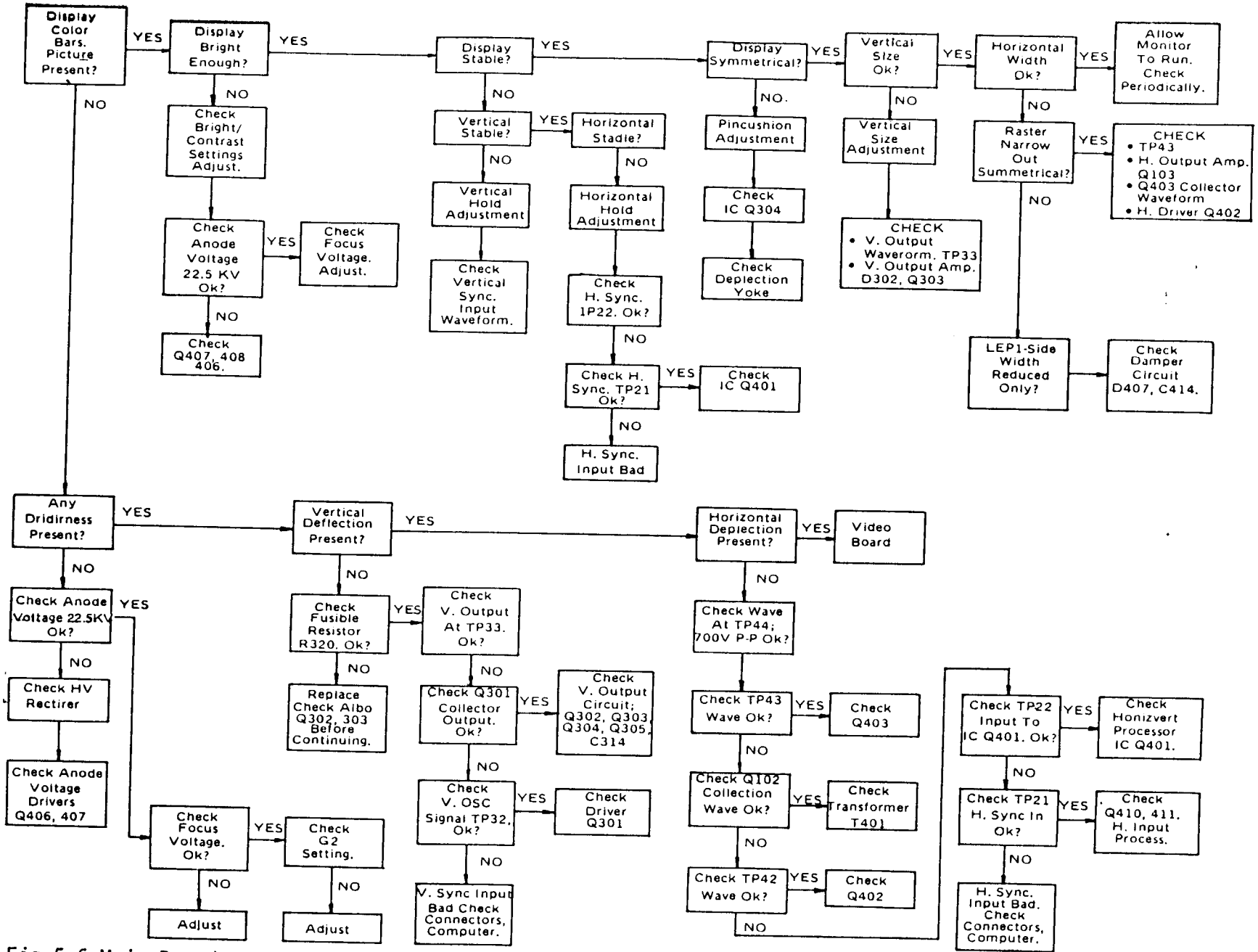


Fig 5-6 Main Board Troubleshooting Chart

CHAPTER 6

P.C.B LAYOUTS

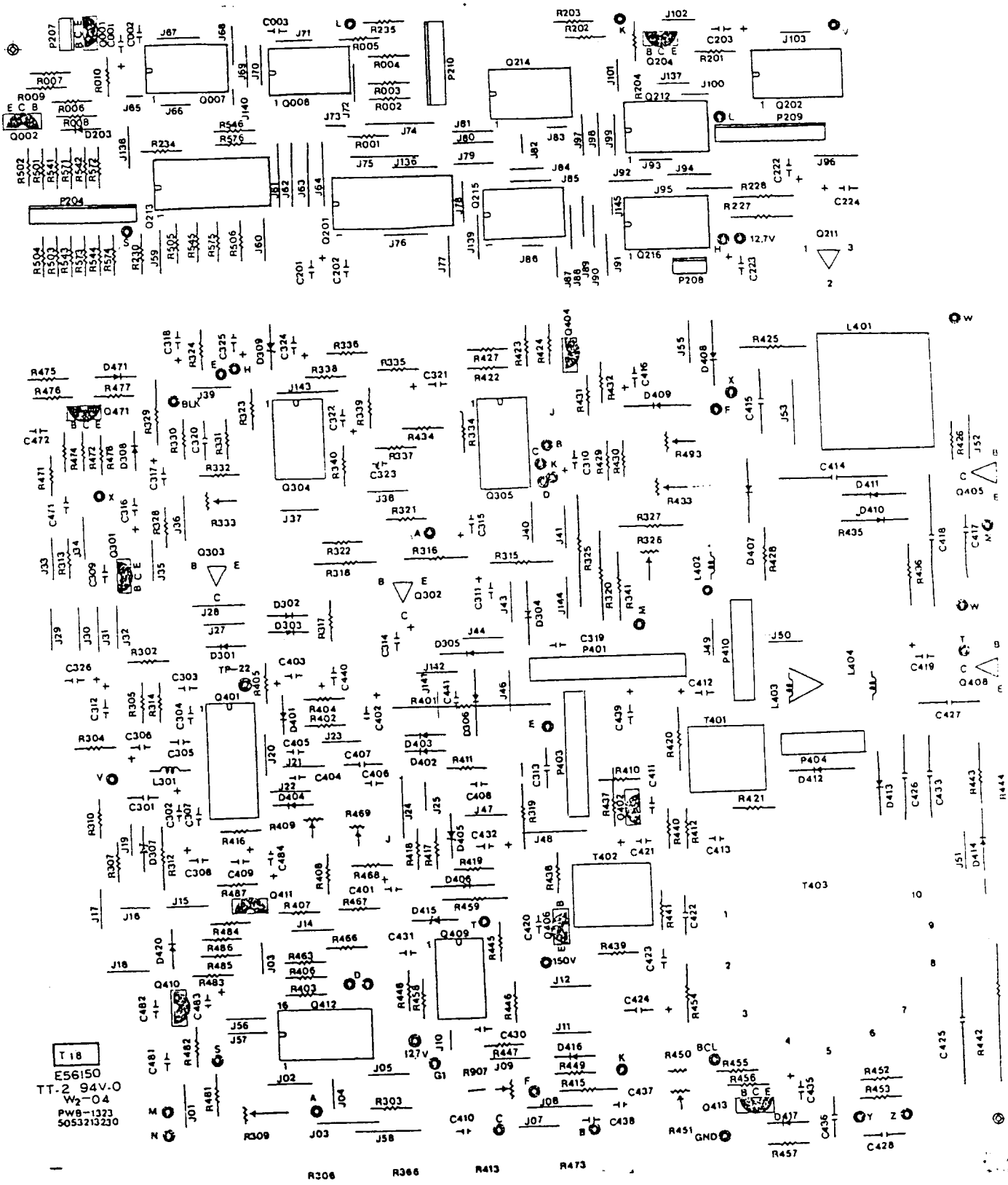


Fig 6-1 PCB-MAIN COMPONENTS LAYOUT

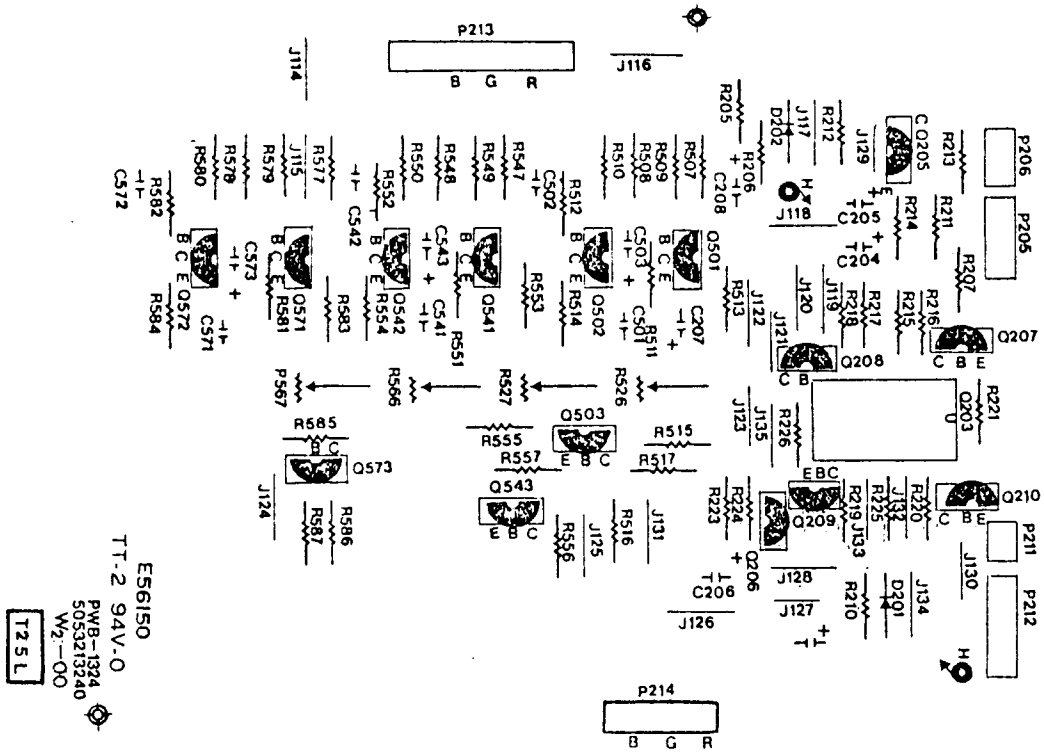


Fig 6-2 PCB-VIDEO DRIVE COMPONENTS LAYOUT

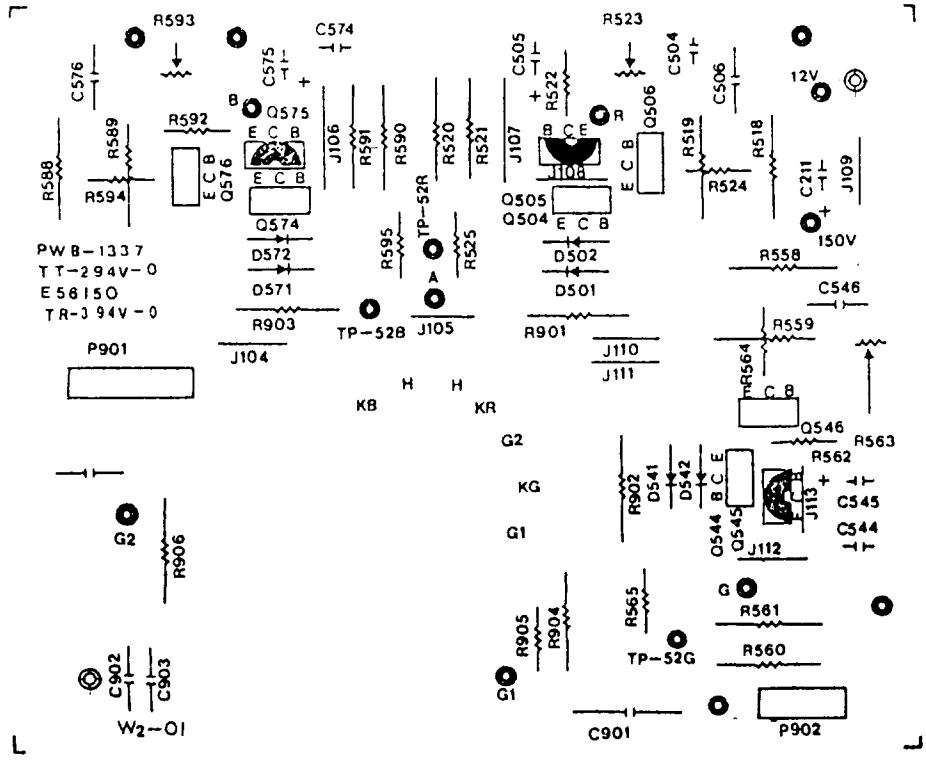


Fig 6-3 PCB-CRT DRIVE COMPONENTS LAYOUT

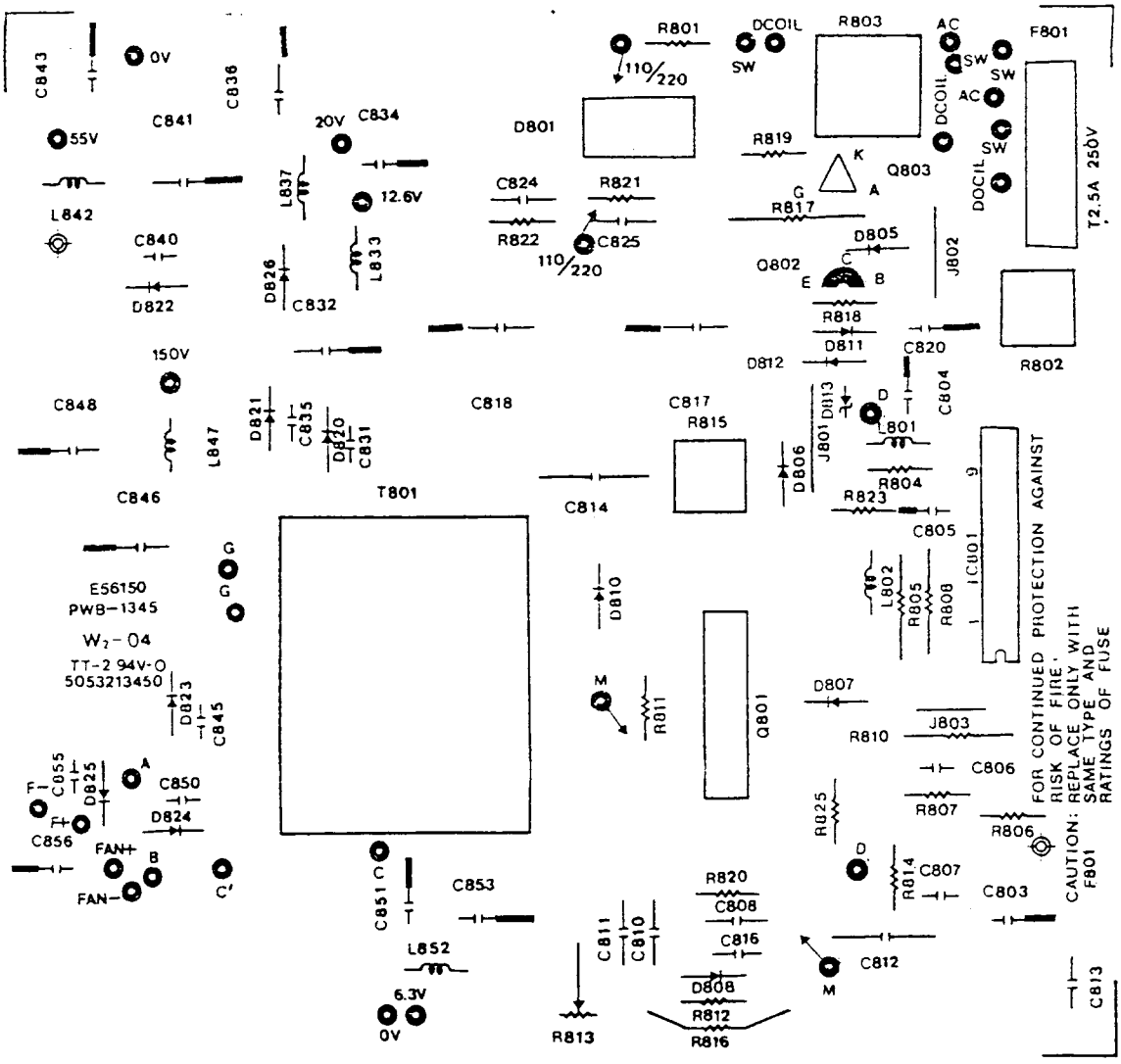


Fig 6-4 PCB-POWER COMPONENTS LAYOUT

CHAPTER 8

REPLACEMENT PARTS LIST

WARNING: Replacement parts which have special characteristics important to safety should be replaced only with types identical to those in the original circuit or specified in the parts list. Before replacing any of these components, read carefully the product safety precaution, do not degrade the safety of the display through improper servicing.

ABBREVIATIONS:

CAPACITORS.....	CD: Ceramic Disc	PF: Plastic Film
	EL: Electrolytic	TA: Tantalum
RESISTORS.....	CF: Carbon Film	VR: Variable Resistor
	CC: Carbon Composition	FU: Fusible
	MOF: Metal Oxide Film	MF: Metal Film

CIRCUIT REF.	PART NUMBER	DESCRIPTION
8-1 ASSEMBLY, AS/WS		
SEMICONDUCTORS		
Q403	6622013400	TR, NPN LF 2SD1094
Q405	6624006201	TR, PNP LF 2SB856
Q407	6621015003	TR, NPN BU208
Q408	6621025900	TR, NPN 2SC2898
8-2 ASSEMBLY, CONTROL		
RESISTORS		
R208, 209	5161161914	VR, 10k
ASSEMBLY, PCB-MAIN PWB-1323-02		
CAPACITOR		
C001	5213322091	EL, 16V 22u
C002, 003	5231810391	CD, 50V 10n, Z5U
C201	5213310191	EL, 16V 100u
C202	5231810391	CD, 50V 10n
C203	5213210191	EL, 10V 100u
C222	5213310191	EL, 16V 100u
C223	5213347112	EL, 16V 470u
C224	5213310191	EL, 16V 100u
C301	5222233391	CD, 50V 33n, 10% Z5U
C302	5213601091	EL, 50V 1u0
C303	5247010191	CD, 50V 100p 5%, NPO
C304	5231368191	CD, 50V 680p 10%, NPO
C305	5247015191	CD, 50V 150p 5%, NPO
C306	5210202691	TA, 35V 1.5u, 10%
C307	5231347291	CD, 50V 4n7, 10%
C308	5213333112	EL, 16V 330u
C309	5232318191	CD, 500V 180p 10%, NPO
C310	5213610112	EL, 50V 100u
C311	5213510091	EL, 35V 10u
C312	5210401391	EL, 16V 10u, 10%
C313	5223433301	POLYPROPYLENE, 250V 27n+/-10%
C314	5213000901	EL, 160V 4.7u
C315	5213622112	EL, 50V 220u

CIRCUIT REF.		PART NUMBER	DESCRIPTION
C316		5214233991	EL, 160V 3.3u
C317		5213647991	EL, 50V 4.7u
C318		5213510091	EL, 35V 10u
C319		5232747291	CD, 500V 4n7
C320		5271147301	POLYESTER, 100V 47n, 5%
C321		5213647991	EL, 50V 4u7
C322		5213647012	EL, 50V 47u
C323		5231847291	CD, 50V 4n7
C324		5213510091	EL, 35V 10u
C325		5213310191	EL, 16V 100u
C326		5210400391	EL, 50V 2u2
C401		5213347091	EL, 16V 47u
C402		5213601091	EL, 50V 1u0
C403		5213322091	EL, 16V 22u
C404		5221268291	POLYESTER, 50V 6n8, 10%
C405		5221215391	POLYESTER, 50V 15n, 10%
C406		5221110291	POLYESTER, 50V 1n0, 5%
C407		5223647201	POLYPROPYLENE, 630V 4n7 5%
C408		5221127291	POLYESTER, 50V 2n7, 5%
C409		5213347091	EL, 16V 47u
C410		5221168291	POLYESTER, 50V 6n8, 5%
C411		5247010191	CD, 50V 100p 5%
C412		5213601091	EL, 50V 1u0
C413		5231847291	CD, 50V 4n7
C414	RA	5223795201	POLYPROPYLENE, 1600V 9n5, 5%
C414	RB	5223295202	POLYPROPYLENE, 1600V 9n5, 5%
C415		5223410401	POLYPROPYLENE, 250V 0u1
C416		5214122012	EL, 100V 22u
C417		5271110501	POLYESTER, 100V 1u0, 5%
C418		5272127501	MF, 250V 2u7, 5%
C419		5214210012	EL, 160V 10u
C420		5247010191	CD, 50V 100p 5%
C421		5213601091	EL, 50V 1u0
C422		5224422301	POLYPROPYLENE, 250V 22n, 10%
C423		5231847291	CD, 50V 4n7
C424		5216347001	EL, 200V 47u
C425		5272122501	POLYESTER, 250V 2u2
C426	RA	5223722201	POLYPROPYLENE, 1600V 2n2, 5%
C426	RB	5223222201	POLYPROPYLENE, 1600V 2n2, 5%
C427		5271147401	POLYESTER, 100V 0u47, 5%
C428		5232710301	CD, 500V 10n,
C430		5231322291	CD, 50V 2n2, 10%
C431		5221410401	POLYESTER, 100V 0u1, 5%
C432		5213622091	EL, 50V 22u
C433	RA	5223733201	POLYPROPYLENE, 1600V 3n3, 5%
C433	RB	5223233201	POLYPROPYLENE, 1600V 3n3, 5%
C435		5213547091	EL, 35V 47u
C436		5221122401	POLYESTER, 50V 0u22, 5%
C437		5222147291	POLYESTER, 50V 4n7, 5%
C438		5221127291	POLYESTER, 50V 2n7, 5%
C439		5213722110	EL, 63V 220u, 5%

CIRCUIT REF.	PART NUMBER	DESCRIPTION
C471	5221147291	POLYESTER, 50V 4n7, 5%
C472	5221122391	POLYESTER, 50V 22n, 5%
C481	5231333191	CD, 50V 330p, 10%
C482	5247082091	CD, 50V 82p, 5%
C483, 484	5213601091	EL, 50V 1u0
RESISTORS		
R001	5142830195	CF, 1/4W 300 R
R002 - R005	5142833295	CF, 1/4W 3k3
R006	5142839195	CF, 1/4W 390 R
R007	5142833295	CF, 1/4W 3k3
R008	5142839195	CF, 1/4W 390 R
R009	5142833295	CF, 1/4W 3k3
R010	5142891195	CF, 1/4W 910 R
R201	5142833195	CF, 1/4W 330 R
R202, 203	5142810395	CF, 1/4W 10k
R204	5142822395	CF, 1/4W 22k
R227, 228	5142433090	CF, 1/2W 33 R
R230	5142812295	CF, 1/4W 1k2
R234	5142810195	CF, 1/4W 100 R
R235	5142822195	CF, 1/4W 220 R
R302	5142847195	CF, 1/4W 470 R
R303	5142827195	CF, 1/4W 270 R
R304	5142820295	CF, 1/4W 2k0
R305	5142815395	CF, 1/4W 15k
R306	5160806110	VR, 1k0
R307	5142810395	CF, 1/4W 10k
R309	5162171720	VR, 5k0
R310	5142827395	CF, 1/4W 27k
R312	5142412190	CF, 1/2W 120 R
R313	5142811395	CF, 1/4W 11k
R314	5142891295	CF, 1/4W 9k1
R315, R316	5130212204	MOF, 1/2W 1k2
R317	5142875095	CF, 1/4W 75 R
R318	5130215904	MF, 1/2W 1R5
R319	5130310004	MOF, 1W 10 R
R320	5133222907	FU, 1W 2R2
R321	5142802095	CF, 1/4W 2R0
R322	5142847995	CF, 1/4W 4R7
R323	5142833395	CF, 1/4W 33k
R324	5142810395	CF, 1/4W 10k
R325	5130412104	MOF, 2W 120 R
R326	5162171920	VR, 10k
R327	5142410290	CF, 1/2W 1k0
R328	5142868295	CF, 1/4W 6k8
R329	5142412290	CF, 1/2W 1k2
R330	5142810495	CF, 1/4W 100k
R331	5142810595	CF, 1/4W 1M0
R332	5142810395	CF, 1/4W 10k
R333	5162171920	VR, 10k
R334	5142810295	CF, 1/4W 1k0
R335, R336	5142810495	CF, 1/4W 100k
R337	5142810595	CF, 1/4W 1M0
R338	5142882195	CF, 1/4W 820R
R339	5142810395	CF, 1/4W 10k
R340	5142882395	CF, 1/4W 82k
R341	5142410290	CF, 1/2W 1k0
R366	5160806110	VR, 1k0

CIRCUIT REF.	PART NUMBER	DESCRIPTION
R401	5136524200	MOF, 3W 2k4
R402	5142868295	CF, 1/4W 6k8
R403	5142868395	CF, 1/4W 68k
R404	5142868295	CF, 1/4W 6k8
R405, R406, R407	5142856295	CF, 1/4W 5k6
R408	5142824295	CF, 1/4W 2k4
R409	5162171710	VR, 5k0
R410	5142847195	CF, 1/4W 470 R
R411	5142822395	CF, 1/4W 22k
R412	5142810295	CF, 1/4W 1k0
R413	5160806119	VR, 10k
R415	5142415290	CF, 1/2W 1k5
R416	5142847295	CF, 1/4W 4k7
R417, R418	5142810295	CF, 1/4W 1k0
R419	5142815295	CF, 1/4W 1K5
R420	5130427103	MOF, 2W 270 R
R421	5142810195	CF, 1/4W 100 R
R422, R423	5142822295	CF, 1/4W 2k2
R424	5142833195	CF, 1/4W 330 R
R425	5142422190	CF, 1/2W 220 R
R426	5142810195	CF, 1/4W 100 R
R427	5142856395	CF, 1/4W 56k
R428	5130351107	MOF, 1W 510 R
R429	5142810495	CF, 1/4W 100k
R430	5142833295	CF, 1/4W 3k3
R431	5142810495	CF, 1/4W 100k
R432	5142810295	CF, 1/4W 1k0
R433	5162171720	VR, 5k0
R434	5142810295	CF, 1/4W 1k0
R435	5162901402	VR, 3W 60 R
R436	5130456003	MOF, 2W 56 R
R437	5130427103	MOF, 2W 270 R
R438	5142810295	CF, 1/4W 1k0
R439, R440	5142818195	CF, 1/4W 180 R
R441	5142827095	CF, 1/4W 27 R
R442, R443	5130718200	MOF, 5W 1k8
R444	5130310007	MOF, 1W 10 R
R445	5142847195	CF, 1/4W 470 R
R446	5142856395	CF, 1/4W 56k
R447, R448	5142810295	CF, 1/4W 1k0
R449	5142810395	CF, 1/4W 10k
R450	5145839390	CF, 1/4W 39k
R451	5162172210	VR, 22k
R452, R453	5142820295	CF, 1/4W 2k0
R454	5133122907	FU, 1/2W 2R2
R455	5142847495	CF, 1/4W 470k
R456	5142810195	CF, 1/4W 100 R
R457	5142810395	CF, 1/4W 10k
R458	5142822195	CF, 1/4W 220 R
R459	5130322207	MOF, 1W 2k2
R463	5142827395	CF, 1/4W 27k
R466	5142843295	CF, 1/4W 4k3
R467	5142830295	CF, 1/4W 3k0
R468	5142824295	CF, 1/4W 2k4
R469	5162171710	VR, 5k0
R471	5142847195	CF, 1/4W 470 R
R472	5142811195	CF, 1/4W 110 R
R473	5160806119	VR, 10k

CIRCUIT REF.	PART NUMBER	DESCRIPTION
R474	5142868395	CF, 1/4W 68k
R475, R476	5142810295	CF, 1/4W 1k0
R478	5142810395	CF, 1/4W 10k
R481	5142810295	CF, 1/4W 1k0
R482	5142810195	CF, 1/4W 100 R
R483	5142839395	CF, 1/4W 39k
R484	5142845395	CF, 1/4W 15k
R485	5142810295	CF, 1/4W 1k0
R486	5142868495	CF, 1/4W 680k
R487	5142856295	CF, 1/4W 5k6
R493	5162171720	VR, 5k0
R501, R502	5142868195	CF, 1/4W 680 R
R503, R504	5142812295	CF, 1/4W 1k2
R505, R506	5142810195	CF, 1/4W 100 R
R541, R542	5142868195	CF, 1/4W 680 R
R543, R544	5142812295	CF, 1/4W 1k2
R545, R546	5142810195	CF, 1/4W 100 R
R571, R572	5142868195	CF, 1/4W 680 R
R573, R574	5142812295	CF, 1/4W 1k2
R575, R576	5142810195	CF, 1/4W 100 R
R907	5162171920	VR, 10k
SEMICONDUCTIORS		
D203, D301, D302, D303	6613001760	DIODE, SWITCHING 1S2076
D304, D305 RA	6613002233	DIODE, SWITCHING V09C
D304, D305 RB	6613002234	DIODE, SWITCHING RGP10D
D306 RA	6611013231	DIODE, RECTIFIER V06E
D306 RB	6611013233	DIODE, RECTIFIER GP15G
D307	6615007930	DIODE, ZENER HZ11A-2
D308	6613001760	DIODE, SWITCHING 1S2076
D309 RA	6615009711	DIODE, ZENER HZ6C-2LTE
D309 RB	6615006431	DIODE, ZENER E0A01-065B
D401 - D404	6613001760	DIODE, SWITCHING 1S2076
D405	6615005800	DIODE, ZENER HZ12A1
D406, D408 - D412, D414 RA	6611017600	DIODE, RECTIFIER V19E
D406, D408 - D412, D414 RB	6611017400	DIODE, RECTIFIER RGP10G
D407, D413	6611013031	DIODE, RECTIFIER RGP15M
D415 RA	6615009703	DIODE, ZENER HZ5C-2TE
D415 RB	6615007831	DIODE, ZENER 05Z5.1X
D416, D417, D420	6613001760	DIODE, SWITCHING 1S2076
D471	6613001760	DIODE, SWITCHING 1S2076
Q001, Q002	6621015302	TR, NPN 2SC1815Y
Q007, Q008 RA	6646006717	IC, DM74LS74
Q007, Q008 RB	6646006708	IC, HD74LS74AP
Q201 RA	6647028100	IC, TBP28S42N
Q201 RB	6646043000	IC, 74S472N
Q202	6646009922	IC, HD74LS86
Q204	6621003200	TR, NPN 2SC458C
Q211 RA	6640000410	IC, HA17805P
Q211 RB	6640001400	IC
Q211 RC	6640001900	IC, AN7805
Q212 RA	6646008000	IC, HD74S05P
Q212 RB	6646008213	IC, SN74LS05N
Q213	6646012713	IC, 74LS244P
Q214, Q215	6646009922	IC, HD74LS86
Q216	6646009400	IC, HD74LS11P
Q301	6621013800	TR, NPN 2SC1921
Q302	6622007400	TR, NPN 2SD1138C

CIRCUIT REF.	PART NUMBER	DESCRIPTION
Q303	6624007400	TR, PNP 2SB861C
Q304 RA	6644042900	IC, HA17324
Q304 RB	6644006703	IC, LM324N
Q305 RA	6645009002	IC, HD14053BP
Q305 RB	6645009001	IC, HEF4053BP
Q401	6644012400	IC, HA11235
Q402, Q404, Q406	6622013300	TR, NPN 2SD667C
Q409 RA	6644042900	IC, HA17324
Q409 RB	6644006703	IC, LM324N
Q410	6621003200	TR, NPN 2SC458C
Q411	6623001102	TR, PNP 2SA844E
Q412 RA	6645009002	IC, HD14053BP
Q412 RB	6645009001	IC, HEF4053BP
Q413, Q471	6621003200	TR, NPN 2SC458C
TRANSFORMERS		
T401	5062412501	TLN-125A
T402	5062412501	TLN-125A
⚠T403	5062617610	TFB-176G 300M R

8-3 ASSEMBLY, PCB-VIDEO PWB-1324-02

CAPACITORS		
C204, C205	5213447091	EL, 25V 47u
C206	5213510091	EL, 35V 10u
C207, C208	5213522091	EL, 35V 22u
C501, C502	5231810391	CD, 50V 10n, Z5U
C503	5213510091	EL, 35V 10u
C541, C542	5231810391	CD, 50V 10n, Z5U
C543	5213510091	EL, 35V 10u
C571, C572	5231810391	CD, 50V 10n, Z5U
C573	5213510091	EL, 35V 10u
RESISTORS		
R205	5142812295	CF, 1/4W 1k2
R206	5142833295	CF, 1/4W 3k3
R207	5142856295	CF, 1/4W 5k6
R210	5142856395	CF, 1/4W 56k
R211	5142833095	CF, 1/4W 33 R
R212	5142810395	CF, 1/4W 10k
R213	5142856295	CF, 1/4W 5k6
R214	5142833095	CF, 1/4W 33 R
R215 - R220	5142822295	CF, 1/4W 2k2
R221	5142833095	CF, 1/4W 33 R
R223	5131782008	MF, 1/4W 820 R
R224	5131715018	MF, 1/4W 1k5
R225	5142810295	CF, 1/4W 1k0
R226	5142815295	CF, 1/4W 1k5
R507, R508	5142847195	CF, 1/4W 470 R
R509, R510	5142815295	CF, 1/4W 1k5
R511, R512	5136147195	MF, 1/4W 470 R
R513, R514	5131710018	MF, 1/4W 1k0
R515	5142856195	CF, 1/4W 560 R
R516	5142833295	CF, 1/4W 3k3
R517	5142882195	CF, 1/4W 820 R
R526, R527	5162907602	VR, 2k0
R547, R548	5142847195	CF, 1/4W 470 R
R549, R550	5142815295	CF, 1/4W 1k5

CIRCUIT REF.	PART NUMBER	DESCRIPTION
R551, R552	5136147195	MF, 1/4W 470 R
R553, R554	5131710018	MF, 1/4W 1k0
R555	5142856195	CF, 1/4W 560 R
R556	5142833295	CF, 1/4W 3k3
R557	5142882195	CF, 1/4W 820 R
R566, R567	5162907602	VR, 2k0
R577, R578	5142847195	CF, 1/4W 470 R
R579, R580	5142815295	CF, 1/4W 1k5
R581, R582	5131747508	MF, 1/4W 475 R
R583, R584	5131717818	MF, 1/4W 1k78
R585	5142856195	CF, 1/4W 560 R
R586	5142833295	CF, 1/4W 3k3
R587	5142882195	CF, 1/4W 820 R
SEMICONDUCTIORS		
D201, D202	6613001760	DIODE, SWITCHING 1S2076
Q203 RA	6644042900	IC, 17324
Q203 RB	6644006703	IC, LM324N
Q205 RA	6624005104	TR, PN BC307B KEC
Q205 RB	6624005102	TR, PNP BC307B
Q206, Q207, Q208	6622002901	TR, NPN BC237B
Q209 RA	6624005104	TR, PNP BC307B KEC
Q209 RB	6624005102	TR, PNP BC307B
Q210 RA	6624005104	TR, PNP BC307B KEC
Q210 RB	6624005102	TR, PNP BC307B
Q501 AA	6621004500	TR, NPN 2N2369
Q501 BA	6621026300	TR, NPN 2SC641K
Q502 AB	6621004500	TR, NPN 2N2369
Q502 BB	6621026300	TR, NPN 2SC641K
Q503	6622002901	TR, NPN BC237B
Q541 AF	6621004500	TR, NPN 2N2369
Q541 BF	6621026300	TR, NPN 2SC641K
Q542 AG	6621004500	TR, NPN 2N2369
Q542 BG	6621026300	TR, NPN 2SCC641K
Q543	6622002901	TR, NPN BC237B
Q571 AN	6621004500	TR, NPN 2N2369
Q571 BN	6621026300	TR, NPN 2SC641K
Q572 AO	6621004500	TR, NPN 2N2369
Q572 BO	6621026300	TR, NPN 2SC641K
Q573	6622002901	TR, NPN BC237B

8-4 ASSEMBLY, PCB-CRT DRIVE PWB-1337-02

CAPACITORS		
C211	5214422912	EL, 250V 2u2
C504	5222222391	POLYESTER, 50V 22n, 10%
C505	5213522091	EL, 35V 22u
C506	5223433301	POLYPROPYLENE, 250V 33n, 5%
C544	5222222391	POLYESTER, 50V 22n, 10%
C545	5213522091	EL, 35V 22u
C546	5223433301	POLYPROPYLENE, 250V 33n, 5%
C574	5222222391	POLYESTER, 50V 22n, 10%
C575	5213522091	EL, 35V 22u
C576	5223433301	POLYPROPYLENE, 250V 33n, 5%
C901	5223622301	POLYPROPYLENE, 630V 22n, 5%
C902, C903	5232000701	CD, 2kV 4n7, 20%

CIRCUIT REF.	PART NUMBER	DESCRIPTION
RESISTORS		
R518, R519	5130427203	MOF, 2W 2k7
R520, R521	5130468203	MOF, 2W 6k8
R522	5142833195	CF, 1/4W 330 R
R523	5162170810	VR, 500 R
R524	5142810195	CF, 1/4W 100 R
R525	5142868095	CF, 1/4W 68 R
R558, R559	5130427203	MOF, 2W 2k7
R560, R561	5130468203	MOF, 2W 6k8
R562	5142833195	CF, 1/4W 330 R
R563	5162907600	VR, 500 R
R564	5142810195	CF, 1/4W 100 R
R565	5142868095	CF, 1/4W 68 R
R588, R589	5130427203	MOF, 2W 2k7
R590, R591	5130468203	MOF, 2W 6k8
R592	5142833195	CF, 1/4W 330 R
R593	5162170810	VR, 500 R
R594	5142810195	CF, 1/4W 100 R
R595	5142868095	CF, 1/4W 68 R
R901, R902, R903	5111233190	CC, 1/2W 330 R
R904	5111210290	CC, 1/2W 1k0
R905	5142815495	CF, 1/4W 150k
R906 RA	5111282490	CC, 1/2W 820k
R906 RB	5142482490	CF, 1/2W 820k
SEMICONDUCTIORS		
D501, D502, D541, D542, D571, D572	6613001730	DIODE, SWITCHING 1S2076
Q504 AC	6621026000	TR, NPN 2SC1507
Q504 BC	6621013700	TR, NPN 2SC1514
Q505 AD	6621004500	TR, NPN 2N2369
Q505 BD	6621014530	TR, NPN 2SC1906
Q506 AE	6621026000	TR, NPN 2SC1507
Q506 BE	6621013700	TR, NPN 2SC1514
Q544 AH	6621026000	TR, NPN 2SC1507
Q544 BH	6621013700	TR, NPN 2SC1514
Q545 AI	6621004500	TR, NPN 2N269
Q545 BI	6621014530	TR, NPN 2SC1906
Q546 AJ	6621026000	TR, NPN 2SC1507
Q546 BJ	6621013700	TR, NPN 2SC1514
Q574 AK	6621026000	TR, NPN 2SC1507
Q574 BK	6621013700	TR, NPN 2SC1514
Q575 AL	6621004500	TR, NPN 2N2369
Q575 BL	6621014530	TR, NPN 2SC1906
Q576 AM	6621026000	TR, NPN 2SC1507
Q576 BM	6621013700	TR, NPN 2SC1514

8-5 ASSEMBLY, PCB-POWER PWB-1345-02

CAPACITORS		
C803	5215310101	EL, 16V 100u
C804	5215347101	EL, 16V 470u
C805	5215310101	EL, 16V 100u
C806	5247033001	CD, 50V 33p
C807	5231322201	CD, 50V 2n2, 10%
C808	5221110391	POLYESTER, 50V 10n, 5%
C810	5271115401	POLYESTER, 100V 0u15, 5%
C811	5272110401	POLYESTER, 250V 0u1, 5%

CIRCUIT REF.	PART NUMBER	DESCRIPTION
C812	5223715200	POLYPROPYLENE, 1600V 1n5, 5%
C813	5221110391	POLYESTER, 50V 10n, 5%
C814	5223647301	POLYPROPYLENE, 630V 47n 5%
C816	5221110391	POLYESTER, 50V 10n, 5%
C817, C818	5210601001	EL, 250V 220u, 20%
C820	5215310101	EL, 16V 100u
C824, C825	5232347291	CD, 500V 4n7, 10%
C831	5232333101	CD, 500V 330p, 10%
C832	5210403501	EL, 35V 1000u
C835	5232333101	CD, 500V 330p, 10%
C836	5215410201	EL, 25V 1000u
C840	5232310201	CD, 500V 1n0, 10%
C841	5216122101	EL, 100V 220u
C845	5232310201	CD, 500V 1n0, 10%
C846	5216347001	EL, 200V 47u
C850	5232333101	CD, 500V 330p, 10%
C851	5215347101	EL, 16V 470u
C855	5232333101	CD, 500V 330p, 10%
C856	5215422101	EL, 25V 220u
RESISTOR		
R801	5101106800	POWER, THERMISTOR
R802	5150107301	CEMENT, 10W 5kO
R803	5101106900	POSISTOR, 200V 20 R
R804	5142812995	CF, 1/4W 1R2
R805	5142439490	CF, 1/2W 390k
R806	5142820195	CF, 1/4W 200 R
R807	5142812295	CF, 1/4W 1k2
R808	5142412490	CF, 1/2W 120k
R810	5142415490	CF, 1/2W 150k
R811	5142827095	CF, 1/4W 27 R
R812	5142810395	CF, 1/4W 10k
R813	5162101920	VR, 1/4W 10k
R814	5142882295	CF, 1/4W 8k2
R815	5150107302	CEMENT, 10W 45k
R816	5136310107	MOF, 1W 100 R
R817 RA	5130315404	MOF, 1W 150k
R817 RB	5142515401	CF, 1W 150k
R818	5142818295	CF, 1/4W 1k8
R819	5142824195	CF, 1/4W 240 R
R820	5142882295	CF, 1/4W 8k2
R821, R822	5142822495	CF, 1/4W 220k
R823	5142801094	CF, 1/4W 1RO
R830	5145827290	CF, 1/4W 2k7
SEMICONDUCTORS		
D801 RA	6611024700	DIODE, KBL06
D801 RB	6611024701	DIODE, RS405L
D805 RA	6611012701	DIODE, V19G
D805 RB	6613002206	DIODE, SWITCHING RGP10J
D806 - D808, D811 RA	6613002202	DIODE, SWITCHING V09E
D806 - D808, D811 RB	6613002205	DIODE, SWITCHING RGP10G
D810 RA	6611012701	DIODE, RECTIFIER V19G
D810 RB	6613002206	DIODE, SWITCHING RGP10J
D812 RA	6611012701	DIODE, RECTIFIER V19G
D812 RB	6613002206	DIODE, SWITCHING RGP10J
D820 - D822, D824 - D826	6611013006	DIODE, RECTIFIER RGP15G

CIRCUIT REF.	PART NUMBER	DESCRIPTION
D823	6611013033	DIODE, RECTIFIER RGP15J
Q801	6621030800	TR, NPN 2SC3461
Q802	6621019101	TR, NPN 2SC2482
Q803 RA	6631001800	THYRISTOR, SCR
Q803 RB	6631001700	THYRISTOR, SCR
IC801	6644058800	IC, TDA4601
FUSE		
⚠F801	5054410501	FUSE, 250V 2.5A
COIL		
L801	5061106600	CORE, B01-AT1F
L802	5062102400	COIL, CHOKE TRF-9229
L833, L837, L842, L847	5062217000	COIL, LOSS TSH-170
L852	5062216900	COIL, LOSS TSH-169
TRANSFORMERS		
⚠T801 RA	5061337101	TPW-371A
⚠T801 RB	5061337102	TPW-371B

8-6 ASSEMBLY, PCB-POWER LINE FILTER PWB-1254-05

CAPACITORS		
⚠C827, C828	5270101501	POLYESTER, 250V 0u47
⚠C829, C830	5230102701	CERAMIC, 400V 4n7
RESISTOR		
R826	5142830490	CF, 1/4W 300k
COILS		
L202	5061102900	TOROID, CORE
⚠L804	5061106900	LINE CHOKE, 40mH

8-7 ASSEMBLY, PCB-INDICATOR PWB-1357-01

SEMICONDUCTORS		
D001	6618014200	DIODE, LED GRN
D002	6618014300	DIODE, LED GRN/RED
D003	6613001760	DIODE, SWITCHING 1S2076
Q003 - Q006, Q009	6621003200	TR, NPN 2SC458C

8-8 MISCELLANEOUS

P204	5057404103	CABLE ASSY
P205	5056505204	4 - PIN SOCKET
P206	5056505104	3 - PIN SOCKET
P208	5056505104	3 - PIN SOCKET
P400, P500, P900	5050200600	TERMINAL SQUARE PIN
P404	5056501312	3 - PIN SOCKET
P410	5056501412	4 - PIN SOCKET
P801	5057409802	4 - PIN PLUG
P802	5057402312	3 - PIN PLUG
S202	5054518600	SLIDER SWITCH
⚠S801	5054519600	MAINS SWITCH
S802	5054524414	SLIDER SWITCH
⚠V901 RA	5051218176	CRT M34JDU30X66
⚠V901 RB	5051219501	CRT E8034B22-TC67ETHT (G7Y)
L901	5060114401	DEGAUSSING COIL

CIRCUIT REF.	PART NUMBER	DESCRIPTION
	5057404103	SIGNAL CABLE (D-SUB 9P)

SCHEMATIC LOCATION	PART NUMBER	DESCRIPTION
D826	6611013006	DIODE, RECTIFIER RGP15G
Q801	6621030800	TR, NPN 2SC3461
Q802	6621019101	TR, NPN 2SC2482
Q803 RA	6631001800	THYRISTOR, SCR
Q803 RB	6631001700	THYRISTOR, SCR
IC801	6644058800	IC, TDA4601
FUSE		
F801	5054410501	FUSE, 250V 2.5A
COIL		
L801	5061106600	CORE, B01-AT1F
L802	5062102400	COIL, CHOKE TRF-9229
L833	5062217000	COIL, LOSS TSH-170
L837	5062217000	COIL, LOSS TSH-170
L842	5062217000	COIL, LOSS TSH-170
L847	5062217000	COIL, LOSS TSH-170
L852	5062216900	COIL, LOSS TSH-169
TRANSFORMER		
T801 RA	5061337101	TPW-371A
T801 RB	5061337102	TPW-371B

ASSEMBLY, PCB-INDICATOR PWB-1357-01

SEMICONDUCTOR		
D001	6618014200	DIODE, LED GRN
D002	6618014300	DIODE, LED GRN/RED
D003	6613001760	DIODE, SWITCHING 1S2076
Q003	6621003200	TR, NPN 2SC458C
Q004	6621003200	TR, NPN 2SC458C
Q005	6621003200	TR, NPN 2SC458C
Q006	6621003200	TR, NPN 2SC458C
Q009	6621003200	TR, NPN 2SC458C

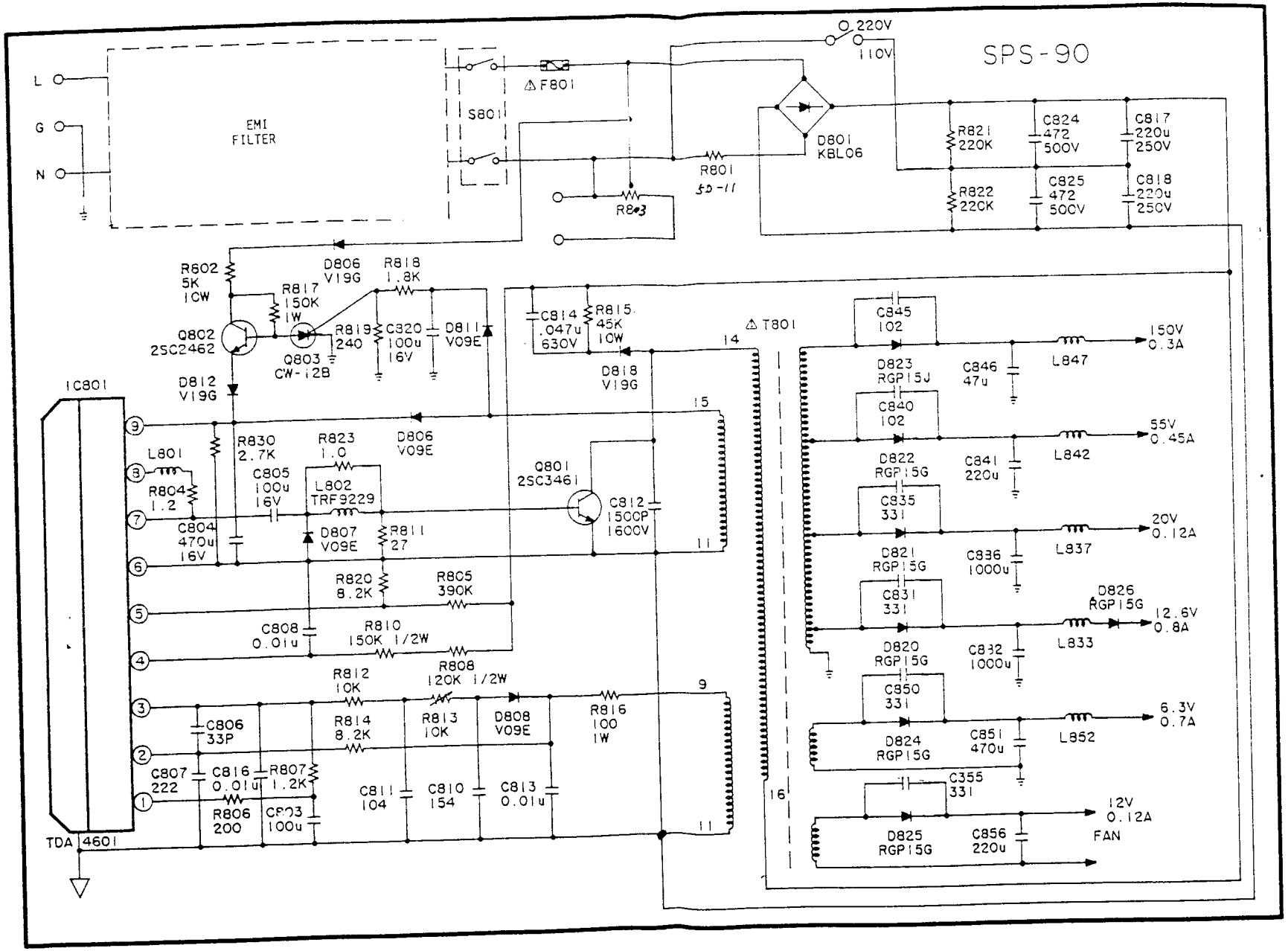


Fig 7-2 POWER CIRCUIT DIAGRAM

CHAPTER 7

SCHEMATIC DIAGRAM

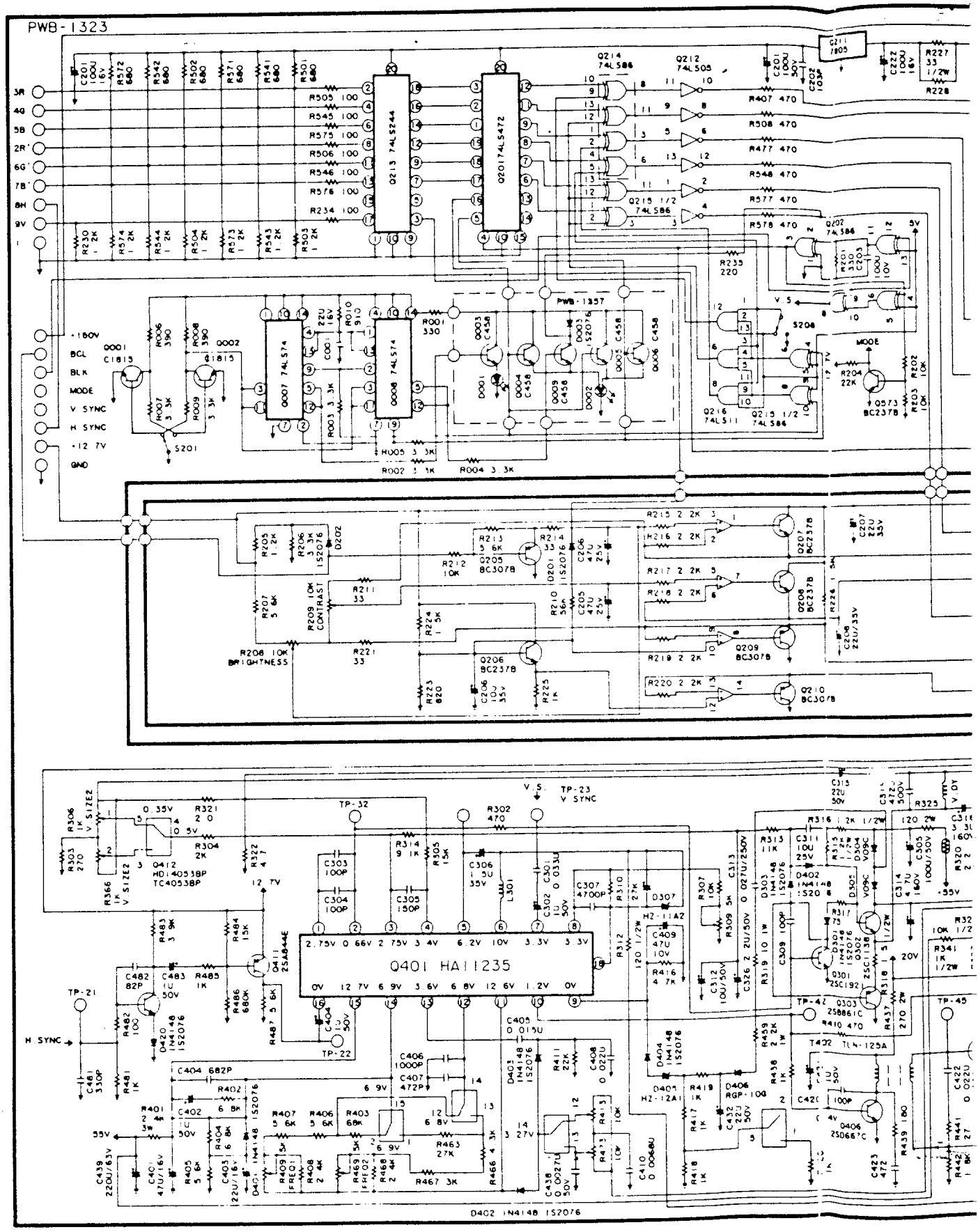
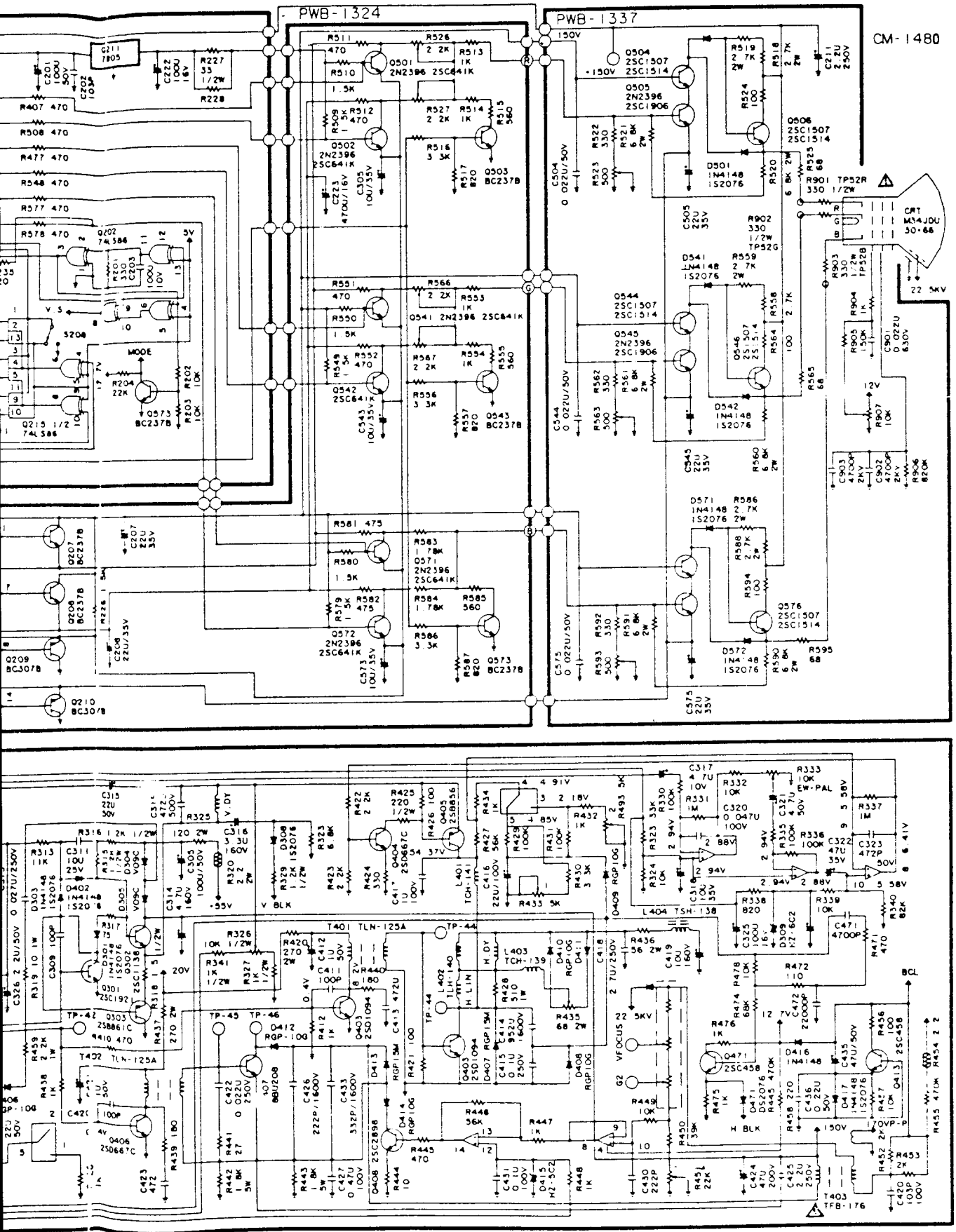


Fig 7-1 MAIN CIRCUIT DIAGRAM


PWB-1324
PWB-1337
CM-1480

CHAPTER 7

SCHEMATIC DIAGRAM

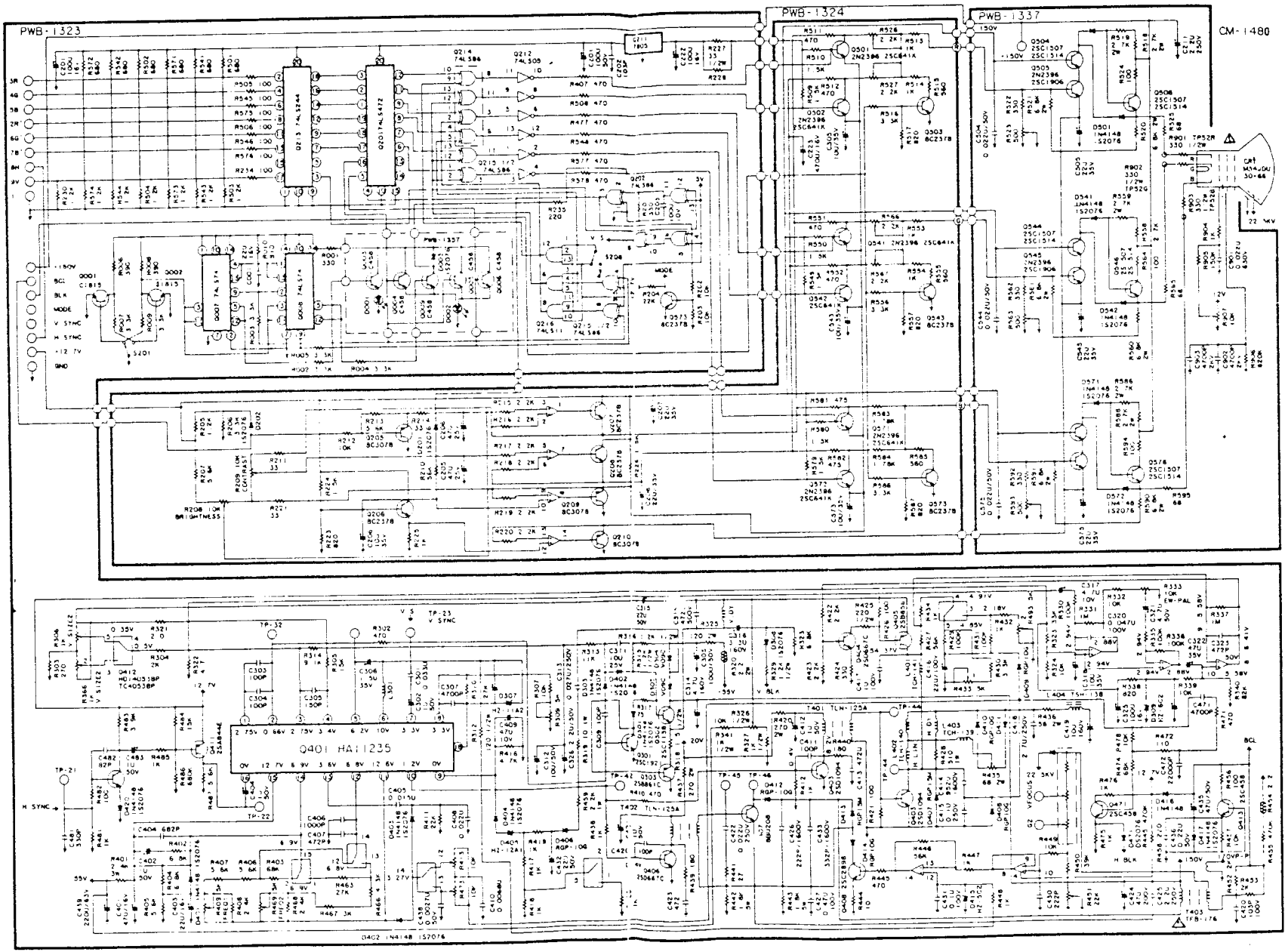


Fig 7-1 MAIN CIRCUIT DIAGRAM